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Index to Advertisers—Page xiii.

Principal Contents:

	PAGE
Activity at Bristol	299
The Prevention of Grit Emission	302
The Radio Exhibition—II. By W. E. Miller	303
Public Utility Finance. By V. Seshasayee	305
Heating a Social Centre	307
The Commissioners' Fuel Returns	308
Scientists at Nottingham	309
Belfast-Stranraer Radio Link	310
Correspondence: A Would-be Consumer's Difficulties; Cooking Utensils	310
New Apparatus and Devices	311
Finnish Domestic Cooking Equipment	312
Better Light—Better Sight	313
More Lamp Publicity Schemes	313
The Australian Electric Refrigerator Market	314
Business and Industrial Notes	315
Electricity Supply	318
Traction and Communications	320
Contract Information	321
Notes	322
Our Personal Column	323
Financial Section	324
Published Specifications	327
New Work for Contractors	328

Co-operative Research

THERE is a great deal to be said for an individualistic approach to problems of science and engineering. An attitude of this kind, allied to ability to make the most of rule-of-thumb and to elevate it to the rank of empirical science, has contributed largely to the position that Great Britain holds in the industrial world.

Reliance on original observation as a guide to action has also provided an exercise to imagination in filling in the gaps not covered by experience; this has borne fruit in numberless discoveries by investigators in this country by which the world at large has benefited. To the success achieved by following traditional lines of thought must be attributed—in some degree, at any rate—the mistrust of "theory" and of organised investigation that has until quite recent years caused research to be regarded with indifference and even hostility.

This was not of so much consequence in days when the gradual acceptance by industry of the almost fortuitous contributions of individual men of genius served the needs of society. Where the system broke down was that, in the face of accelerating industrial progress, it took no conscious count of possible changes in social conditions and lacked purposeful direction, while the time lag between the working out of a scientific idea and its practical exploitation proved a severe handicap in meeting international competition.

A technique achieving a relatively limited objective was required, and this has been supplied by modern methods of organised research. Recognition of the latter as an indispensable tool of industry to-day has been more rapid abroad than it has here, as Sir Alexander Gibb showed in his presidential address to the Engineering Section of the British Association yesterday. One result of this has been that many discoveries of British origin have been developed to their logical conclusion in other lands.

Much lee-way has been made up lately and it is not difficult to prove that expenditure on laboratories by research associations and large manufacturing concerns has been a most profitable one. That definite returns are naturally anticipated from applied research should not, however, lead to the expectation in all cases of immediate tangible results. Investigations of the greatest ultimate worth, generally speaking, take longest to mature, and it is for this reason that research is so eminently a fit matter for endowment.

Sir Alexander's survey of the modern research movement leads logically to his conclusion that not only should the work of individuals be co-ordinated but that voluntary research organisations also should be linked up through a central body in order to avoid waste of duplicated effort. Closely related to this is the question of how to make available to every one interested the vast quantity of data accumulated by such bodies. His constructive proposal is that these duties should be undertaken by the Department of Scientific and Industrial Research. He does not mean, however, that engineers should shelve their responsibilities this way—they must work out their own scheme.

So much for the machinery of research. What of the men who make it go? The value of the man of genius remains what it always has been, but such men are far too few and the organised effort of others is needed to supplement their work. Scope is thus provided for many who, while not possessing the same outstanding qualities, are nevertheless of a high order of intellectual capacity and have hitherto had little scope for their special talents.

Within the flexible framework provided by a research laboratory, each accepts data provided by colleagues and adds his individual touch before sending it on its way to take the form in which it will appear before the world. From the creative diversity inherent in their team spirit will come the immediately useful ideas that in our own time seem an essential adjunct to the fundamental principles explored by individual pioneers.

Power Station Performance

THE substitution of the kWh sent out for the kWh generated basis in calculating thermal efficiency almost compensates for a delay of four and a half months in the issue of the Commissioners' "Fuel Returns" this year. It is the correct basis, yet even now there are some undertakings which, seemingly, do not know how much energy is required to drive their auxiliaries. The new way makes it difficult to compare individual results with those attained in previous years, but assuming the same allowance for auxiliaries last year as this, the leading station, Battersea (London Power Co.) has improved its last year's thermal efficiency by 0.5 per cent. Dunston B, now freed from the limitations imposed by frequency change-over, has taken its chance to climb to second place. The third station, Barking B, uses only 4.22 per cent. of the kWh generated on auxiliaries—a figure well below the average of 5.17 per cent., coal used per kWh sent out by all stations fell by 0.05 lb. approximately.

A Grid Anomaly

WITH commendable restraint the West Midlands Joint Electricity Authority calls attention to the fact that in the course of a year electricity purchased from the grid cost it £186,000 more than if the Authority had generated the energy itself. It would appear from the statement, which we reproduce on another page, that the position is due to the method of control exercised by the Central Electricity Board which made it necessary for the Authority to purchase energy in excess of the amount which it actually supplied to the grid. While purchases up to the latter amount are charged for at the special rate for owners of selected stations, the excess over this has to be paid for at the ordinary grid tariff. If we read the statement aright, the Authority suggests that if its stations had been permitted to generate the whole of its requirements this extra expense would not have been incurred. The hope is expressed that when the present extensions at the Ironbridge station are completed the loading of the selected stations in the area will be so controlled as to bring the Authority within the scope of the tariff designed for selected stations and afford it some measure of benefit in return for its heavy capital outlay in the national interest.

More Enlightened

A FORTNIGHT ago we made reference to two electrical applications in which this country was ahead of the United States—trolley buses and water heating. One of our readers now suggests a further direction in which we are more advanced than the States. It seems incredible that the country of "great white ways" and lavish lighting should be three years behind us in the adoption of the coiled-coil filament lamp which is claimed to increase the lamp's efficiency by 10 to 20 per cent. Nevertheless, it is true that, while the coiled-coil filament was introduced to the British public in 1934, an American contemporary announced in June last the advent of "the greatest forward step in tungsten filament lamps since the invention of the gas-filled lamp in 1913," which proves to be nothing but the coiled-coil filament. Again, in the lighting field, the electric discharge lamp has made greater headway here than in the United States, and so we should be suffering less from that electrical inferiority complex than we were some years ago.

Gaining an Entry

How many sales of apparatus have been lost through the inability of the salesman to get inside the consumer's home and so have an opportunity of pointing out the deficiencies of the electrical installation and equipment? Householders do not like strange men marching all over the place without some adequate reason, and we don't blame them. But if, when they are buying lamps, the seller offers to "send a man round" to see if they are using the right size lamps to avoid damaging their eyesight, surely they can have less objection. It will cost them nothing, and they will feel happier to know that they have done something to safeguard their own and their families' eyes. And when the salesman gets inside the house—well, it is up to him! This is the idea behind a novel scheme which the Edison Swan Electric Co., Ltd., is just introducing and which will, no doubt, prove of very practical assistance both in connection with the E.D.A.—E.L.M.A. "Better Light—Better Sight" campaign, and with sales of lighting equipment and electrical apparatus generally.

Public Lighting

With a growing appreciation of the necessity for better illumination of the nation's thoroughfares the Association of Public Lighting Engineers has increased in importance and its Annual Conference is now a national event. A valuable feature of the Conference is the exhibition of street-lighting apparatus combined with demonstrations of lamps and equipment in actual use. At Folkestone next week (September 6th to 9th) an excellent show is being arranged for the 700 delegates. Over thirty installations will be seen in operation; about half of these will be electric and it is noteworthy that they are all discharge-lamp installations, mainly mercury vapour. The president this year is a gas engineer, Mr. C. I. Winstone, but his address will show him to be very fair-minded, giving due credit to electrical developments. Six papers are being read and they are apportioned equally between the two rivals. One, by Mr. G. H. Wilson, B.Sc. (G.E.C.), deals with the application of modern electric lamps to street lighting. "Some Further Experiments in Street Lighting" will be described by Dr. S. English and Mr. E. Stroud (Holophane) in another contribution, while a paper on "Planned Street Lighting" by Messrs. T. Catten, R. Maxted and G. S. C. Lucas, is in the nature of a commentary on two films which the authors intend to show. The social functions will include a luncheon, the annual banquet, a conversazione and motor coach excursions.

An Exhibition in 1938?

WE believe that at the moment of writing the fate of the proposal to hold a National Electrical Exhibition in November next year is still in the balance. In all probability a definite decision will be reached within the next ten days. In view of the fact that the subject has been widely discussed within different sections of the industry for some time past, it is desirable that something should be settled one way or the other without any further delay. It was obvious from the meetings held during the early months of the summer that some time must elapse before the industry could be committed to so large an undertaking at what is, comparatively speaking, an early date. The attitude of the municipal electricity supply undertakings as represented by the I.M.E.A., may be gathered from the following notes appearing in the I.M.E.A. *Journal* for September, which comes to hand just as we go to press:—

"The I.M.E.A. Council has received and considered a report and financial statement in connection with the proposed National Electrical Exhibition, 1938, under the auspices of the British Electrical Development Association. It appeared that this Association would be asked to provide a sum of approximately £15,000, and that the money be found by making a percentage increase in the subscription to E.D.A. The Council gave the matter long consideration and the general consensus of opinion was that, apart from the question as to whether there should be an exhibition or no, this Association is unable to make any substantial contribution towards the cost of the Exhibition, neither could it recommend its members to do so, but it would be willing to consider the taking of a small space for the purpose of drawing the attention of the general public and others to the various activities of municipal supply undertakings. It is felt that as E.D.A. receives funds from the municipalities, it would appear that it is the proper body to organise and finance the exhibition on behalf of the supply authorities."

Activity at Bristol

Influence of a "thousand trades"

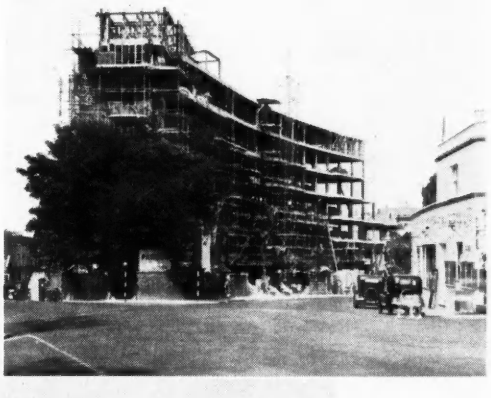
THE impression of Bristol as a city of a thousand trades was received during a recent investigation of the business activities of the Corporation Electricity Department by the courtesy of Mr. A. J. Newman, M.I.E.E., chief engineer and general manager. Out of a total of 240,500,000 kWh sold to the undertaking's consumers during the past year 150 million kWh was delivered to power consumers. The following are ten of the principal industries in Bristol and their demands on the undertaking, totalling 28,650 kW: Docks, including dockside industries, 6,200 kW; aeroplane construction, 4,500 kW; chocolate and cocoa manufacture, 3,300 kW; chemical works, 3,300 kW; tobacco manufacture, 5,000 kW; printers and paper mills, 1,500 kW; iron and engineering works, 1,300 kW; tanneries, 500 kW; flour and provender mills, 2,700 kW; and brickworks, 350 kW. In addition, swimming pools account for 1,500 kW and public lighting for 1,350 kW.

The anticipated load for next winter for Bristol only is 85,000 kW, so that the greater part of the undertaking's output is absorbed by the very many smaller industrial concerns. The districts and premises are so mixed that we found it impossible to obtain reliable figures representing commercial or business loads, as distinct from industrial and domestic demands.

The total area served by the undertaking is about 100 sq. miles, and, very roughly, its boundary is the River Avon in the south-west, with a continuation in that direction almost to Bath. It then turns back sharply to Bristol City, embracing a narrow strip between Bath and south-east Bristol, where a sharp turn, first, roughly north and then north-west, widens the area to about six miles, which width is maintained to a point on the River Severn. Within this greater area is the 37 sq. miles of the City and County of Bristol, with its boundary coincident with that of the greater area in the south and south-west.

We may be excused for regarding the area as a whole in a "triple concentric" formation for the purpose of simplifying classification. At the hub there is older Bristol city, with its high density of industrial premises and with a part to the north which can be fairly defined as a business area. The inner belt is one of residences and small industries, embracing the purely good-class residential areas of Clifton and Redland in the north-west; Knowle and Fishponds housing estates in the south and north-east, respectively; and a small area in the east which is devoted mainly to the boot industry. In the outer belt there are housing estates at Sea Mills, Southmead and Horfield in the west, north-west and north, respectively, as well as the aeroplane manufacturing industry area in the north at Filton and the residential and the small industries area at Somerdale in the south-east.

The Bristol Corporation's Portishead power station



Above: The Queen's Court flats in course of erection; specially designed rising mains are being installed. Left: The Avonmouth distribution centre. Below: The Knowle Park housing estate with the new 500-kW sub-station in the foreground

Main Distribution Scheme

Bristol's older power station at Feeder Road at the south of the city is at present the main distribution and receiving centre for the greater part of the area. The major load growth is about the areas, Redland and St. Paul's to the north-west and north of the city, respectively, and to cope with continued expansion a new scheme of transmission and distribution has been designed with a receiving centre in each of these districts.

Work for the first stage, to be completed for next winter, is well advanced. There will be a receiving centre at Cairns Road (Redland) and to this transmission will be effected directly at 33 kV from Portishead generating station. From Cairns Road 33-kV and 11-kV cables will transmit temporarily at 6.6 kV to the St. Paul's area, the new cables being temporarily jointed to the feeders in the St. Paul's area. By the winter of 1938 the second receiving centre at St. Paul's will be established with three direct feeds from Portishead and a 33-kV interconnection with Cairns Road, which will have one direct 33-kV connection to Portishead. When the load demands it the third stage of the scheme will consist of four 33-kV cables from Portishead direct to each of the new distribution centres.

The scheme is a modification of the present system merely to the extent of altering the situation of the main receiving centre to suit modern conditions, and the fact that the arrangement is so readily adaptable to the system points to desirable flexibility and good initial design. This is also evident in the ease with which normal growth is handled. Within roughly a radius of two miles there are about the Feeder Road centre a number of 6.6-kV, 0.3 sq. in. and 0.15 sq. in. ring mains embracing master switch-

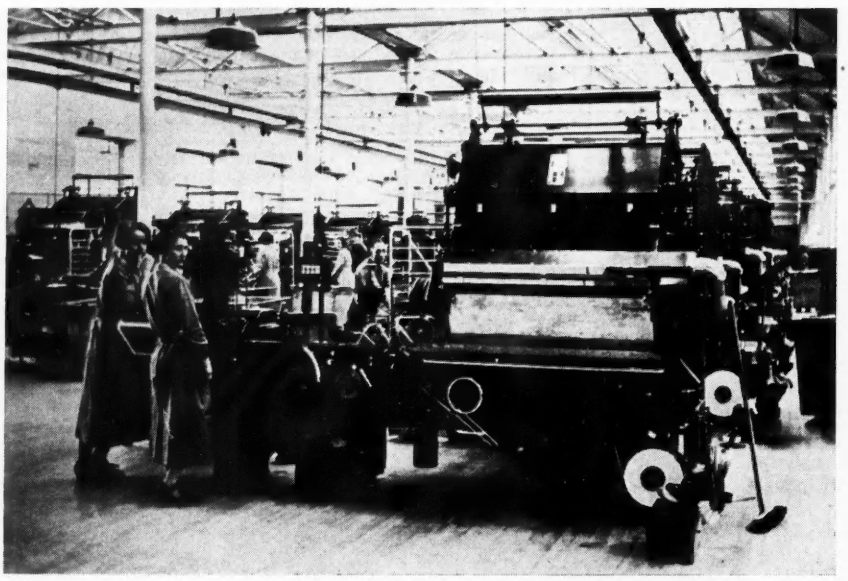
ing stations, from each of which five or six 0.1 sq. in., 6.6-kV feeders serve secondary transformer sub-stations. The outer 11-kV rings are also served by the distribution centre.

On a smaller scale the scheme is repeated at Avonmouth, where a main distributing centre receives energy at 33 kV from Portishead and reduces the pressure to 6.6 kV for distribution to a number of secondary sub-stations about the docks *via* a master switching station, and to 11 kV for the suburban areas of Stoke Bishop, Coombe Dingle, Southmead and Henleaze.

For l.v. distribution in the dense areas (210/365V) 0.1-sq. in. and 0.2-sq. in. cables normally radiate from the secondary subs to the residential and industrial localities respectively. When distributors become fully loaded 0.4-sq. in. cables are laid from the sub-station to a distribution box or pillar, into which the network cables are then "turned." This scheme can be repeated with new boxes subsidiary to existing ones. Sizeable factories are, of course, supplied direct at e.h.p. and 11-kV cables have already been laid from the new Cairns Roads centre to the aeroplane factory at Filton.

In the outer areas cables and lines are laid from the 11-kV master stations, usually with a view to establishing a subsidiary e.h.v. ring for the district, the constructional work being kept abreast of commercial development. A subsidiary ring now completed for the Winterbourne and Stoke Gifford area to the north-east of the city embraces an underground main on the right wing with a loop at Frenchay and branches to such places as Hambrook and Winterbourne, and an overhead line on the left wing with spurs to such places as Harry Stoke and Stoke Gifford. With the completion of the ring adequate switching facilities have been provided at each spur to permit isolation in any direction.

Another scheme in a less developed stage, in that the ring is not yet completed, is that for the Severn area. An overhead line takes supply to Redwick in the north-west, *via* Cattybrook, Easter Compton and Northwick, and continues back on the return but unfinished leg to Severn Beach. Considerable importance is paid to the appearance of sub-stations in the residential districts, because good design puts the Department on good terms with the consumers. In particular we may mention the sub-station on Durdham Downs, which has seats around it on which people rest under the overhanging eaves.



Electrically-operated cigarette making machines at the Bedminster factory of W. D. & H. O. Wills

Industrial Influences

At the aeroplane works at Filton the fast-growing load is at present about 5,000 kW and the weekly consumption about 350,000 kWh. There are six sub-stations at the works. Very high-class engineering in the machine shop is responsible for a continuous and steady production load of 1,800 kW. There is a lighting load of about 1,500 kW and 450 kW is used for the production of compressed air for pneumatic chucking on machine tools to very fine limits. There are a number of engine testing stands, each with a 550-h.p. wind-tunnel fan drive and a 300-h.p. engine starting drive on the dynamometer. A thousand or so portable drills are used on the metal construction of the aeroplane frames.

About 30,000 tons of tobacco is imported annually into Bristol. The following information relates to all the factories in Bristol of the Wills branch of the Imperial Tobacco Co., Ltd. Electricity is used for motive power for all processes, the principal of which are stripping and cutting the leaf, and the manufacture and packing of cigarettes and pipe tobacco. In general, individual drive and push-button control for each machine has been adopted. Private generation plant exists for each factory and duplicate bus-bars are provided to allow feeders to be supplied either from this source or from the Corporation's mains. The maximum demand is about 1,750 kW, of which 400 kW is for lighting. The annual consumption is 3.5 million kWh, of which over 2 million kWh is received from the public supply. The total installed h.p. of motors is 4,000 in about 950 units.

The transit granary and three storage granaries at the Avonmouth Docks, with a total capacity of 62,000 tons, are all interconnected by conveyor bands which permit the removal of grain at will in either direction. The six miles of bands have 190 driving motors totalling 3,000 h.p.

The pumping station for dewatering the graving dock and impounding into the main dock has recently been converted to electric driving. There are three 650-h.p., 267-r.p.m. s.r. motors driving Wynn pumps, two of which normally empty the 3,350,000-cu. ft. graving dock in three hours. Sluice gate and lock-gate-winch drives have also recently been converted; 20-h.p. s.c. motors are coupled to the barrel of the old hydraulic drive through fluid couplings which are thus employed as slipping clutches.

The Bristol Airport is not a big user of electricity perhaps, but it is one indication of the essential link between electricity supply and all modern industrial developments. Its 9-kW, 1,200,000-c.p. night-landing flood-lights are a spectacular feature.

There are now in Bristol three swimming pools where electricity is used both for heating the pool water and for space heating. Each pool has two 400-kW low-voltage electrode boilers. The total demand in each case is 500 kW and the water-heating load is 120 kW. A 1,000-kW e.h.v. electrode boiler has also been installed in a new clinic for space heating and hot-water supply. A considerable number of electric vehicles is attributed partly to the encouragement given by the special night tariff and partly to the easing of the battery-charging problem brought about by the development of the self-contained charging sets.

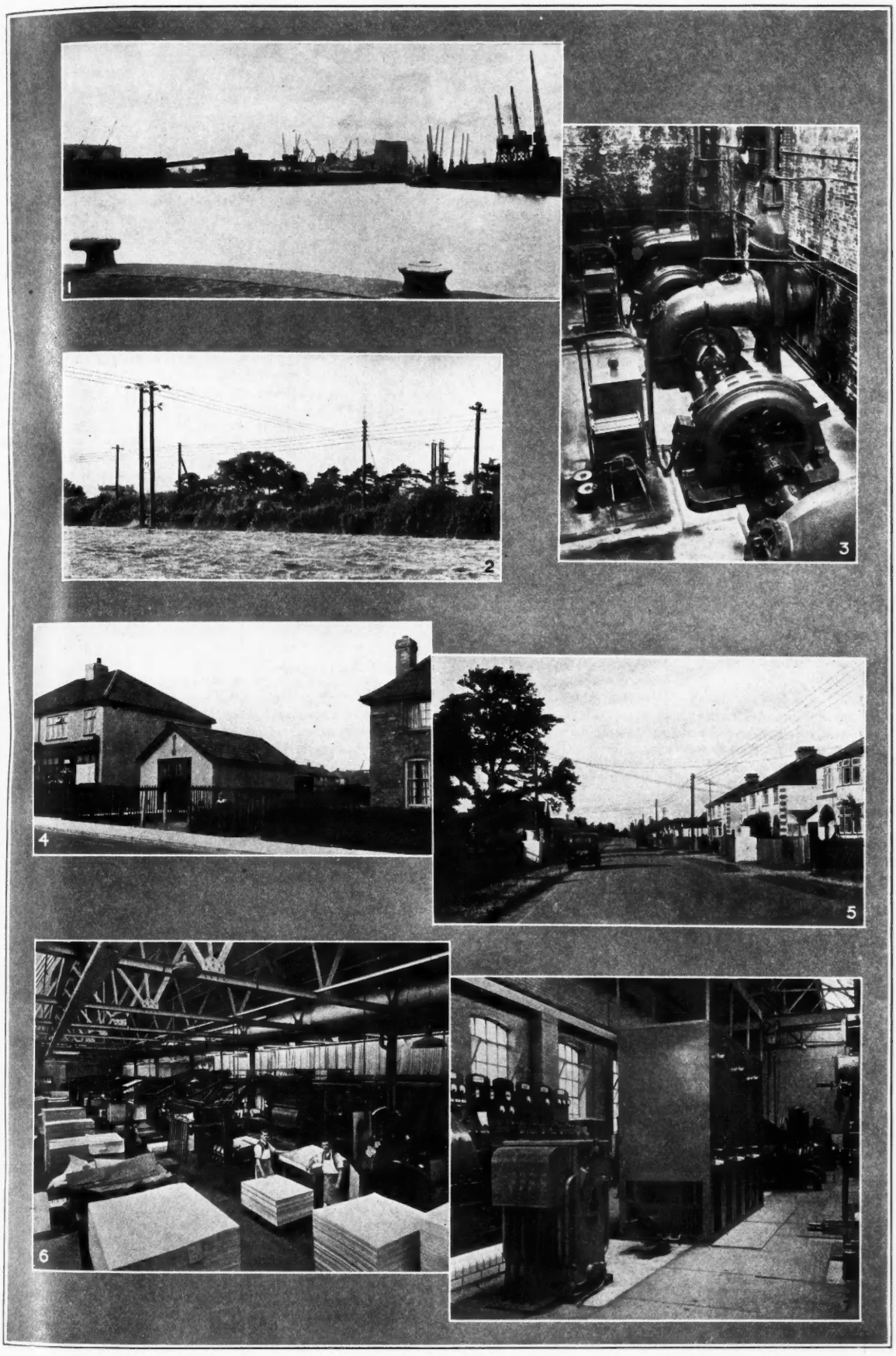
With a maximum demand of 2,430 kW, something like a million kWh per annum is consumed in the production of cocoa and chocolate at the factory of J. S. Fry & Sons, Ltd. Extracting cocoa butter from the beans in hydraulic presses, grinding cocoa, refining chocolate, chocolate moulding and wrapping are a few of the electricity-using processes. There are five ammonia compressors driven by 45-h.p. to 130-h.p. motors serving brine circulating plant for chocolate cooling.

In the eight special paper and printing works of E. S. & A. Robinson, Ltd., the total annual consumption is nearly 3¼ million kWh, with a maximum demand of 1,540 kW. This load has been trebled in the past ten years The motors range from fractional h.p. to 40 h.p. and for some of the drives variable-speed commutator motors are employed.

The Domestic Field

To obtain the greatest possible revenue from existing capital expenditure is the principal aim in the development of the domestic load. On suitable occasions such as, for instance, when the combined tariff was introduced, attractive informative literature is sent out with a personal letter to consumers in those areas in which the mains and cables are adequate to meet the anticipated increased load.

The chief object of regular local press advertisements is to build up the cooking and water-heating loads by emphasising the advantages of the combined tariff and encouraging the hiring of equipment. The use of such continual publicity has certainly resulted in a very marked increase in the business of the undertaking, for since 1932-33 the domestic units sold, cookers on hire and water heaters on hire have increased from 12 million to 63.6 million, from 2,000 to 12,000, and from nil to 14,500, respectively. The cookers and water heaters on hire at June 30th, 1937, numbered 12,717 and 15,127, respectively.



Some of the Varied Activities in the Bristol Area

1. A section of Avonmouth Docks showing part of grain-conveying system. 2. Four-member tee-off structure at New Passage and branch line to Severn Beach. 3. New pumps at Avonmouth Docks. 4. New sub-station on housing estate, replacing kiosk at rear to cope with growing load. 5. Houses served by a new line at Severn Beach. 6. Two-colour printing machines at Robinson's folding box factory. 7. Main sub-station at Filton aeroplane factory, showing 500-kW rectifier equipment and (right) stand-by generating plant.

Considerable importance is attached to supporting advertising by showroom and local demonstration work. As the result of an experiment with short-period local showrooms at the time of the introduction of the combined tariff, three local showrooms are now established in residential districts. From the Staple Hill showrooms over 1,000 cookers and 1,000 water heaters have been hired out since their inception in 1934. The combined domestic tariff in the city area has a rateable-value fixed charge and a running charge of ½d. per kWh in the winter and ¼d. in summer. Charges outside the city are 10 per cent. higher.

Demolition work has now been completed on the prominent island site at Colston Avenue, facing the existing offices on one side and the War Memorial at the site apex for the new central offices and showrooms.

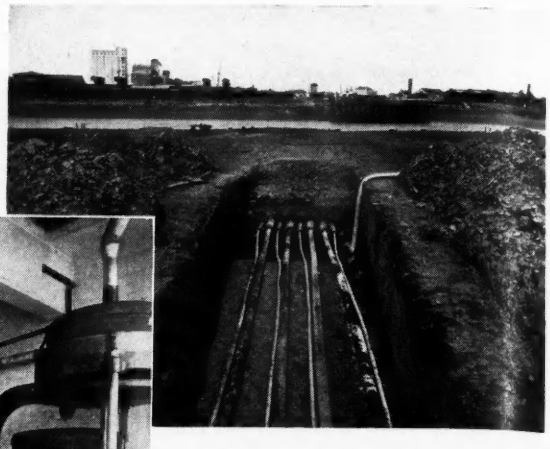
Personal contact with the consumer is regarded as vitally important. Representatives who advise consumers and prepare installation schemes, &c., perform this duty, whilst lady demonstrators visit consumers' residences to advise or instruct as required in connection with cooking. It is intended to extend and intensify the "personal contact" policy.

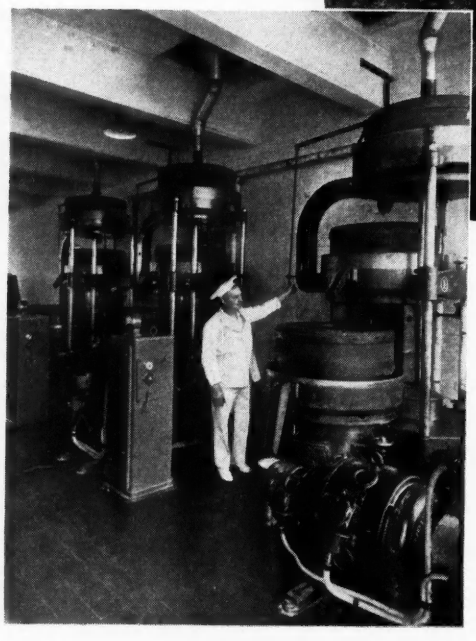
One very interesting publicity venture of the undertaking was to arrange, in conjunction with a local evening newspaper, mass cooking demonstrations in one of the largest halls in Bristol. The stage of the hall was fitted up as an all-electric kitchen and a cooking demonstrator was in attendance. The newspaper interested manufacturers of cooking ingredients, such as flour, in the scheme, and attracted the public by advertisements for two weeks before the demonstrations. A small exhibition was arranged in a room leading off the hall, large-space advertisements from all interested in the demonstrations were inserted in the paper, and over 600 people came to each demonstration.

Largely because of the aeroplane manufacturing developments there has been a large influx of new people into Bristol for some time and this is having a considerable influence on the undertaking, chiefly with housing-estate developments.

At Patchway, near Filton, many of the aeroplane factory workers are being accommodated in a very large estate which is at present under development. Eight sub-stations will provide the electricity requirements on this estate. The largest estate, at Knowle, has 5,000 houses and three schools and is served by five sub-stations. On this and four other estates there are in all about 13,600 houses.

Arranging for all-electric house demonstrations on new building estates is an important part of the undertaking's publicity work. The co-operation of the builder is secured and in return for the demonstration facilities the undertaking advertises the house by press and circular.





Above: 33-kV Siemens cables, with pilots, laid across the River Avon. Left: Electrically driven cocoa-grinding machines at Fry's factory

Residential flats have not yet been developed in Bristol sufficiently to show any influence on the electricity supply, but there is a good electrical story in the Queen's Court block of eighty flats now being erected. Each consumer has his own separately metered supply by means of rising mains at five different positions and horizontal runs. Special pre-impregnated non-bleeding armoured cable is employed for the risers on the diminishing size principle—0.2 sq. in. for the first and second floors, 0.1 sq. in. for the third and fourth floors, and 0.05 sq. in. for the fifth and sixth floors. Three and four horizontal feeds are arranged at each floor, and for these connections special boxes were made to the undertaking's design. Each box has a disconnecting link for each phase and balancing is done on a floor-to-floor basis.

While nothing special is done to develop normal space heating on account of the poor load factor, consumers are not discouraged from installing equipment. Refrigeration is regarded as a small but valuable load, in that it is a summer one, and considerable advance is being made in this direction.

Even in these days of energy exportation the load building activities of any undertaking must be reflected in the generating station development. The present plant capacity at Portishead is 90,000 kW, and a further extension of 50,000 kW is now being carried out at this station, which is designed for an ultimate capacity of 340,000 kW.

The Prevention of Grit Emission

AMONG the papers submitted at the jubilee conference of the Sanitary Inspectors' Association at Brighton this week, was one in which Mr. A. Tyler, chief sanitary inspector of Bath, asks why pulverised fuel furnaces and generating stations in which mechanical stokers are installed are subjected to so much criticism in respect of the emission of grit. Why not similarly criticise cement works, coke-screening plant, refuse collection and destruction and street cleaning methods? The author briefly summarises various types of dust extraction plant, including electrostatic precipitation, and quotes efficiencies of from 50 to 95 per cent. This means that from 5 to 50 per cent. of the dust content of the flue gases may be extracted. Although one may be satisfied that a nuisance can arise, it would, however, appear from experience in some districts to be very difficult to prove a case in law, or to decide whether the "best practicable means" have been taken to prevent a nuisance arising. A user cannot be told to scrap his apparatus and install something better, and the author would be successful. He says it is reasonable to assume that the lower the grade of coal used the larger will be its ash content and consequently the greater the risk of grit emission. If the only reason for the use of low-grade fuels is economy, then the public has a right to ask whether it is reasonable for health to be endangered in the interests of industrial economy. The author repeats a suggestion he has made before, namely, that when a pulverised fuel fired furnace is causing a nuisance the local authority should be empowered to forbid the use of low-grade fuels containing more than 7 per cent. of ash. He advocates legislation forbidding the construction of further pulverised fuel fired installations until total grit extraction is practicable, except under guarantee that satisfactory grades of coal will be used. He maintains that if pulverised coal plant were gradually replaced by stoker fired plant the nuisance might be considerably reduced. In any case, the coal used should be effectively screened and washed, and he also advocates a limit of fineness to which coal should be pulverised.

Books on Electrical Engineering

The Library Association has issued a "Readers' Guide to Books on Electrical Engineering." About 400 books grouped in thirty-nine sections are included, and Mr. J. Corthesy, librarian of the I.E.E., has been consulted in making the selection. Names of authors are given first and appear in alphabetical order. Dates of publication are indicated in each case, so that a prospective reader can see at once whether a book is likely to meet his requirements in regard to recent developments. Some of the books mentioned remain the best written on their subjects, but may be somewhat out of date in certain respects. This relates, of course, more especially to works dealing with practical applications.

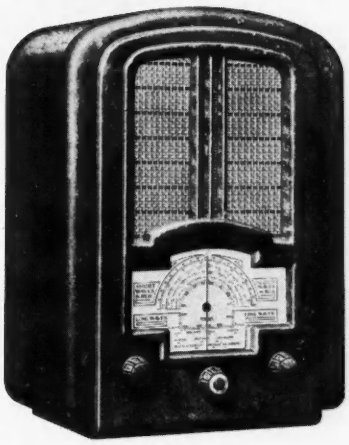
The Radio Exhibition—II.

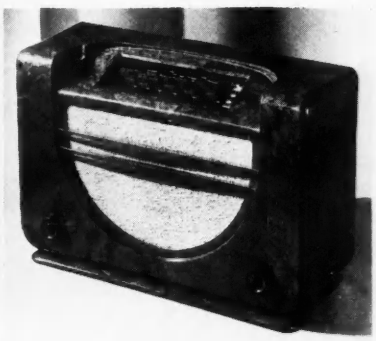
By W. E. Miller, B.A.(Cantab.), M.I.W.T.

Television developments and improvements in radio sets and components

THE twelfth National Radio Exhibition, which opened at Olympia on Wednesday, August 25th, and continues until to-morrow, September 4th, is notable for the fact that television is being strongly featured, even though at present the service area for television reception is not much greater than a 25- to 30-mile radius from Alexandra Palace.

Last year the few receivers available were priced at 90 to 120 guineas; this year several concerns are showing receivers at from £35 to £50. These, in general, have a somewhat simplified specification, and provide smaller pictures than the larger models priced at from £60 to £130. Among the exhibitors of low priced television sets may be mentioned Baird, Ekco, G.E.C., Halcyon, Invicta, Pye and Ultra. These are all complete sets for television sound and vision reception except the G.E.C. model, which incorporates the vision receiver, and an arrangement permitting almost any standard a.c. sound receiver to be used for the reception of the television sound. This is the model priced at £35; the lowest priced complete receiver is the Ultra T20, at 38 guineas. This gives a 7¾ in. by 6¾ in. picture, using a special cathode-ray tube with magnetic, and not electrostatic, deflection of the beam.





Right: The Ferranti 837 employs a bakelite cabinet, and incorporates an all-wave superheterodyne circuit for a.c. mains. Left: An example of tasteful cabinet design by Mullard (MAS6 all-wave a.c. superheterodyne)

The constructor of television receivers so far has not very much choice of equipment or designs, but mention must be made of the model designed by the *Wireless World*, which is on view on its stand, and of the B.T.S. model, by British Television Supplies, Ltd., for which a complete set of parts (less cabinet) can be purchased for 55 guineas.

As was forecast a fortnight ago several large-screen models made their appearance at the opening of the Show. One of these is the Philips, using a projection type of cathode-ray tube, operating at a very high voltage, and enabling a picture 20 in. by 16 in. to be obtained. The provisional price of this model is understood to be 160 guineas. Surprise announcements were made by The Gramophone Co., Ltd. (H.M.V.) and the Marconiphone Co., Ltd., of projection-type receivers, the picture size being 22 in. by 18 in. in each case. E. K. Cole, Ltd., who it was expected would be showing Ekco-Scophony large-screen models employing the Scophony mechanical-optical system, announced that, pending the alterations in the synchronising pulses which are being transmitted by the B.B.C. television station, production of these receivers had been delayed, and a range of cathode-ray types is therefore shown by Ekco this year.

The Ultra T20 television receiver, giving a 7¾-in. by 6¾-in. picture

The fourteen television demonstration rooms are being filled at each performance. Each room is occupied by one of the firms making television receivers, namely Baird, Cossor, Ediswan, Ekco, Ferranti, G.E.C., Halcyon, H.M.V., K.-B., Marconiphone, Philips, Pye, R.G.D. and Ultra. Other television receiver exhibits are by B.T.S., Haynes Radio, Invicta and the *Wireless World*.

Cathode-ray tubes are shown by several companies. It is interesting to note that in many cases there is a tendency to drop the type employing electrostatic deflection, and to use magnetic deflection and focusing. Ediswan, Mullard and Baird have magnetic tubes, while Cossor tubes are electrostatic. The sizes of the television tubes range from 9 in. screen diameter to about 15 in. diameter, but Baird is showing a 22 in. tube as supplied to the Fernseh Company for use at the recent Berlin show.

The introduction of television apparatus has resulted in specialised components being produced by several firms. Thus, Dubilier and T.C.C. make special high-voltage condensers for power supply units, Belling-Lee make terminal connectors and valve-holders to withstand high voltages, while All-power Transformers, Ltd., B.T.S., Heayberd, Sound Sales and Varley show transformers, chokes, &c. Westinghouse has some special high-voltage, low-current metal rectifiers, while most of the valve manufacturers make special types for television circuits.

These special valves include high gain r.f. pentodes such as the Marconi-Osram MSP41, the Mazda AC/SP3, and the Mullard TSP4. Another interesting valve is a special output triode, the Mazda AC/P4, designed for the output stages of time bases, having its anode brought out to the top cap connector. The B.T.H. Co. also has a miniature single diode, the D1, only about an inch long and one-third of an inch in diameter, with its connections taken to short, stiff wires projecting from glass "pinches" at each end of the bulb. The valve is intended for suspension on the wiring of the receiver, and has a very low inter-electrode capacity. High-voltage valve rectifiers are shown by several exhibitors, including Mullard. One type is the HVR2, giving 3mA output at 6,000 V.

The diverse nature of the ordinary radio receivers and radiograms shown is evidenced by the fact that at one end of the scale we have sets which can be carried in the pocket (Hivac), while at the other there are radiograms with large external cabinet speakers which could not comfortably be used in a small room (Dynatron). Between these extremes of size and price there must be hundreds of different models catering for every possible requirement. In general the bulk of these sets fall in the 8- to 15-guinea price class. It is possible to-day to buy an a.c. superheterodyne receiver covering the medium, long and one short waveband at a price of 7 to 9 guineas (Cossor, Philips, Mullard, Pye, Ferranti and many others).

Cabinet design, in general, shows little change, but on the whole the impression is that more attention is being paid to the quality of the wood and the general finish. Cabinets which also serve as coffee tables, bookcases, &c., are shown by several concerns, including H.M.V., Alba, Gilbert, Pilot and Texaloom. In the case of the last mentioned the cabinet is of woven material, and the speaker needs no separate "grille." Bakelite cabinets, which are used for the less expensive receivers, are employed by Ferranti and Ekco, and others.

I have felt for some time that high-fidelity reception will only become possible when manufacturers commence to house the speaker system quite separately from the receiver proper. This year some manufacturers of quality receivers are adopting this principle, the speakers being separate, and either mounted on external baffle-boards, or in special cabinets which have been correctly designed from the acoustic point of view. Such concerns include Dynatron, Pye, Haynes Radio and Sound Sales.

Receiver Construction

There was a time when an output of 2 W was regarded as being large for a domestic receiver. Succeeding years have produced larger and larger output stages, until this year a 12- to 15-W output from a radiogram is not at all uncommon.

In many cases the 6-8-W output quoted for table receivers

is obtained from a single output pentode, the Mullard Pen B4 being popular for this purpose. On the other hand, push-pull output stages employing triodes are now quite common.

The introduction of the output tetrode has resulted in its use in many output stages where normally a pentode would be used. Two methods of eliminating the negative resistance kink in the tetrode characteristic, and thus avoiding the need for the pentode's suppressor grid, are used. One makes use of a critical spacing of the various electrodes, and the other uses guide electrodes to concentrate the electron stream into a beam. This is the method used in the American "beam" power output valves. Some receivers this year have negative feed-back circuits incorporated in their output stages, which results in greater undistorted outputs being obtained from a given valve or valves. Such sets include models by Mullard, Philips, McMichael and others.

Turning now to the earlier parts of the circuits the frequency changer valve most commonly used at present, particularly in all-wave models, is the triode-hexode, although the heptode, octrode and triode-pentode are still favoured by some makers. There is now a tendency to return to two-valve frequency changing circuits in superheterodyne receivers, with a hexode mixer (Marconi-"Osram," Tungsram, Mullard and Ever Ready) and a separate triode oscillator.

R.f. stages preceding the frequency changer are quite common on receivers around the 15-guinea class. I.f. stages are not changed to any extent, though triple-tuned i.f. transformers are used by some makers, such as Bush and Portadyne. Variable selectivity, by altering the coupling between the i.f. transformer windings or by switching in damping resistances, is incorporated in some models. Second detection (demodulation), a.v.c. and first stage l.f. amplification is provided either by double-diode triode valves, double-diodes and separate triodes, or, where no l.f. stage is incorporated between the demodulator and output stage, by a combined double-diode and high-efficiency output pentode. Apart from variable selectivity, some sets have circuit refinements such as automatic tuning correction and contrast expansion (R.G.D.), automatic tone correction and so on.

Ekco "spin-wheel" tuning

Particularly interesting circuits are used in the Dynatron models, which combine "straight" reception for high quality and superheterodyne circuits for range and selectivity. The change from one circuit to the other is carried out by the selectivity control, the least selective position changing the circuit from superheterodyne to "straight."

This is undoubtedly an "all-wave" year, and there are few firms that have no all-wave models. Some, in fact, have none which are not all-wave. In most cases a single waveband of 16 to 50 metres justifies the "all-wave" designation, but other sets include up to four s.w. bands. One set tunes from 4.5 m. upwards (Pilot), while Pye, Belmont, Philips, Mullard, Marconiphone, H.M.V., to name only a few, go down low enough to cover the television sound channel. In others (Ekco, for instance) the television sound channel is received at a certain switch position.

Improved Tuning Controls

There has been great activity in the production of special scales, tuning controls, and so on, with the object of increasing the ease of tuning. Among the scales may be mentioned the Portadyne "Rotomatic," in which only one waveband is seen at a time, the large Halcyon and McMichael types and the Ultra, which is external to the receiver cabinet.

Flywheel tuning, in which the drive is coupled to a heavy wheel, enabling the knob to be "spun" and the whole scale to be traversed in a short time, is introduced by Halcyon, McMichael, Ekco and others. Ekco makes a feature of its "knobless" receivers, which have flush "spin-wheel" tuning controls at the ends of the tuning scales, with lever-operated switches and other controls.

New valves, apart from those mentioned in passing earlier in the article, include the recently introduced "international" range by Marconi and the G.E.C. ("Osram"). These have characteristics similar to those of the corresponding American types, and are fitted with the same type of base, known as the octal. This has eight pins evenly spaced, and the centre of the base carries a cylindrical pillar with a projecting key, which fits into a corresponding key-way in the valve socket. These valves can be inserted correctly with perfect ease in a holder which is out of sight and it seems likely that the new base will replace the older pin types as time goes on.

Although these valves, and others of the American type which are to be seen on certain stands, employ heaters of the 6.3-V type, receivers in general still use 4-V a.c. valves, as well as 13-V and higher voltage types for series connection in a.c./d.c. receivers. Incidentally, the purely d.c. receiver has quite disappeared, but most firms make both a.c. and a.c./d.c. types. Philips and Mullard make certain a.c. sets which, by the addition of a vibratory convertor unit, are able to be operated from d.c. mains.

Mention must be made of a valve development which seems to have decided possibilities. It is the Harries all-stage valve. This is a multi-electrode type so designed that it may be used in any stage of a "straight" or superheterodyne receiver which has been designed for it, except in the h.t. rectifier position.

Other Equipment

As might be expected, there is little change in accumulators and batteries, most of the well-known concerns such as Chloride, Ever-Ready, Ediswan, Fuller, Pertrix, Siemens and Sterling showing their usual types in augmented ranges. Battery charging equipment is shown by Westinghouse, Ediswan, Partridge Wilson (Davenset), Crypton and Heavberd, the last-named having this year gone over to metal rectifiers, which are produced in its own works. The Milnes Radio Co., Ltd., has long specialised in an h.t. accumulator of the alkaline type which can be charged from the l.t. battery. This year it has introduced a gas-operated l.t. charger. The system employed is based on the use of a large number of thermopiles.

Service and test equipment is very prominent this year. Such concerns as Automatic Coil Winder (Avo), Bulgin, Cossor, E.M.I. Service, Ferranti, Hunt, Mullard, Pye, Radiolab, Radiometers, Rose, Salford Electrical, Telsen, Wright and Weaire ("Wearite") and Weston show wide ranges of meters, circuit analysers, valve testers, capacity meters, signal generators and other specialised equipment. Cathode-ray oscilloscopes and ganging oscillators are exhibited by Cossor.

Domestic loudspeakers show very little change this year, and they are now all of the moving-coil type. Detail improvements have, however, been made in some models, with a view to improving the response and the even diffusion of the sound. The elliptical diaphragm is quite popular in this respect. In the public-address field new types are introduced, such as the Goodmans concentric diffuser, but pride of place is taken by the Tannoy high-power model developed for naval purposes. Handling a speech input of 300 W, and having the high acoustic efficiency of 50 per cent., it really deserves the name "loudspeaker."

The suppression of interference is coming more and more into the public eye, and this year the G.P.O. exhibit is devoted to it, while Belling-Lee, as usual, have a stand on which it is largely featured. New suppressors have been introduced to augment an already wide range, and suppression engineers covering the whole of the country, equipped with portable interference locators, are now employed by this concern.

Suppression equipment is also shown by Dubilier, T.C.C., Bulgin and others Incidentally, Dubilier has on its stand an interesting visual demonstration of the advantages of power factor correction by means of condensers.

Automatic record changers are shown by Collaro and Garrard. Both have types which will handle mixed records of different sizes.

Finally, leaving the trade exhibits, mention must be made of the very interesting museum of equipment, some of it dating from pre-broadcasting days, which has been arranged by the Radio Manufacturers' Association at one end of the gallery.

Electricity at "No. 10"

Considerable alterations and improvements are being carried out at No. 10, Downing Street, the residence of Great Britain's Prime Ministers for more than two hundred years. The internal arrangements are being largely reorganised, one feature being the extension of a passenger lift to serve all floors of the house. Particular attention is being paid to the lighting which at present is hardly up to modern standards. Adequate, but restful, lighting is being provided throughout the building and an innovation is the installation of tubular lamps to illuminate a number of the paintings with which the walls are adorned. A certain amount of electric heating is also being introduced, the Premier's study and the conference room being equipped with up-to-date apparatus. Moreover, thermostatic control is being provided for a number of the rooms in connection with the modernisation of the central heating system. Another feature is the installation of a modern internal telephone system.

Public Utility Finance. By V. Seshasayee, Comp.I.E.E. (Trichinopoly)

Methods of computing depreciation and building up reserves

IF there is any problem in accounting to which the executives of public utility undertakings in these days address themselves with particular care, it is the fixation of a correct formula for building up reserves, particularly the reserve necessary to keep the investment intact and to provide against deterioration, obsolescence and inadequacy. In these, as in other business concerns, the orthodox and settled principle has been that the extent of these depreciation reserves should represent the difference between cost and intrinsic or present market value.

In his article in the ELECTRICAL REVIEW of January 22nd Major H. G. Howard, Chief Engineer for Electricity to the Government of Madras, while starting with this aim in view, appears to treat public utility undertakings, particularly electrical undertakings, as standing on a separate footing. He seems to imply that the building up of "depreciation" reserves in excess of 40 per cent. of the investment in the case of thermal generating stations and 30 per cent. in the case of hydro-electric stations and transmission lines would be injurious to the interests of the public for whose benefit licences are granted by the State to such undertakings.

I must confess to considerable difficulty in appreciating this view. The figures in respect of British-owned and managed undertakings employed in the article are admittedly neither complete nor fully informative and even they do not seem to support the inference drawn by the writer. No reasoned argument except the citation from Nash's *Economics of Public Utilities* has been advanced in support of this opinion.

That this opinion cannot be accepted straightaway can easily be made clear. Electricity supply licences are given both to local bodies and to private companies. In the case of local bodies the capital needed to cover the whole of the investment in the undertaking is generally secured in the shape of debentures or loans repayable in full at the end of a period, say, thirty years. The method of repayment is usually by a periodical contribution to a sinking fund.

If, as Major Howard's article suggests, the contribution to the depreciation and other reserves should not exceed 30 to 40 per cent. of the investment it would seem to follow that contributions to the sinking fund need be made only up to a percentage of the borrowings. This evidently could not have been intended. But the method adopted by private licensees of making reserves up to the full cost of the investment is only an alternative to the sinking fund method and, if the percentage theory is inapplicable to undertakings by local bodies, some convincing reason for its application to private licensees would have to be established.

Monopoly and Competition

The only difference between a public utility undertaking based on a licence—which though not strictly a monopoly is intended to be one—and other industrial concerns is that the business is a steady one and is not likely to be affected by fluctuations due to direct competition. It is true in this sense that unnecessary reserves need not be provided, and, in the interests of the public, may not be allowed to be built up. But, like any other manufacturer of goods, the supplier of electricity has to take into account all the charges which go to make up his cost before fixing the price of distributed energy.

Depreciation is one such charge and it should not be discontinued after a few years from the commencement of the undertaking as a result of relying on some theory or speculation. Every licensed public utility concern, at any rate in India and England, has an option-of-purchase clause. The management of the undertaking, if it has built up unnecessarily large reserves, is not likely to benefit by the exercise of the option, while, if the reserve is not really adequate, the authority exercising the option, if it pays for the undertaking the book value of the investments, will be purchasing an asset not worth the payment. Inadequacy of reserve here means that the depreciation fund represents less than the actual wastage of the property.

It may be that a study of the balance sheets of even very old companies engaged in such undertakings does not show reserves having reached the cost of the original investments, and it is possible that Nash in his book and Major Howard in his article have inferred from this that depreciation reserves may be fixed at a maximum percentage and thereafter discontinued.

From some observations appearing in the article, however, Major Howard himself appears to contemplate that constant calls would have been made by the executive on the depreciation fund to maintain the property at its correct valuation so that when this maximum percentage is reached the properties of the undertaking, through renewals, additions, &c., would have been brought to a condition at which this percentage would really represent the difference between the original cost and the then market value.

If this is the view, there appears to be no virtue in fixing the percentage at all. It only means that reserves have to be built up to the requirements. But fixing a maximum percentage for the reserve and advising discontinuance of further contributions, without a clear indication as to the manner in which retirements and replacements are to be made from revenue, is likely to prove a dangerous doctrine.

The business of a public utility is an ever-growing one, so that there will be substantial additions to the assets. Assuming that an all-round average rate of depreciation, ranging from 2½ to 4 per cent. until this fund reaches 100 per cent. has to be provided, the period during which this contribution will have to be made will range from twenty-five to forty years. If each year a programme of extension (addition) equal to 10 per cent. (on an average) of the initial block account is carried out, at the end of twenty years the assets will be nearly 300 per cent. (100, plus 20 by 10) of the initial outlay. Against this the depreciation will stand at only 120 per cent. (based on the 3 per cent. straight-line method), *i.e.*, at 40 per cent. of the block account. This cannot mean that this percentage represents the limit to which the depreciation reserve should be built up. Depreciation has indeed to be built up till the original cost of the corresponding item of asset is reached; that this 100 per cent. is not reached in practice is due to the periodical additions above referred to, *i.e.*, the time-diversity factor.

[*Elec. Rev.* photo.

A general view of the Radio Show at Olympia which is dealt with in the preceding pages

While I agree that the fixing of the percentage for annual contribution to depreciation in respect of machinery should depend on a correct appreciation of the physical diversity factor of all the component parts of the asset, I am unable to see how this factor affords any justification for limiting the extent to which contributions are to be made. How can the physical diversity factor of the various units constituting the asset, each of which has only a limited useful life, result in the making of the combined life of all the units unlimited? That is to say, so long as one recognises that every unit of the assets has only a limited useful life, provision for depreciation should be made to the full value of that unit, though the annual percentage of the contributions will have to depend on the length of the unit's useful life, so that within the time when the least deteriorating unit would have perished all other units would have perished and by the time each perishes a provision for replacement has been made available.

For clearness, I would classify the heads under which reserves are to be provided, as follows:—

(*a*) To ensure that the shareholders' investment is not impaired. This may be called "depreciation reserve" and made a first charge on the net revenue.

(*b*) Provision for extraordinary repairs and maintenance due to storms and other abnormal causes. This "contingency reserve" will be a second charge on the net revenue.

(*c*) Provision for writing off non-tangible assets such as preliminary expenses. The proper method is to write off directly a percentage of such assets annually bringing them down to nil instead of complicating the reserve account by building up a reserve and showing these assets at a fixed figure permanently.

(*d*) Provision for unforeseen contingencies, dividend equalisation, extra taxation, losses due to higher prices, etc. I would call this a "stabilisation reserve."

Depreciation Reserve

It is best to adopt the definition of the first item put forward by Gill and Cook: "Depreciation as a financial measure may be defined as:—(i) Provision for the diminution in value of the plant or asset, in place and working (*i.e.*, its loss in value to the owner as a continuing plant), by reason of causes *outside* his control, such as age, wear and accidents. (ii) Provision to enable the owner to take the plant (or asset) out of commission before the physical life is exhausted in cases where from either progress of the art or growth of the business, it is economically advisable to do so, by reason of causes *within* his control."

The rate of provision per year should be determined for each item of property on its estimated useful life. There is also no objection, for the sake of convenience, in arriving at a flat rate for all the property taking into consideration the physical diversity factor of the several items constituting the property. For electricity supply undertakings the flat rate may vary from 2½ to 4 per cent., the rate being nearer 2½ per cent. in the case of hydro-electric stations where investment in transmission and distribution lines is comparatively bigger than in the generating plant, and nearer 4 per cent. in the case of thermal stations and urban area undertakings where the generating plant is costlier than the transmission and distribution system. The whole or part of this contribution would go to form a sinking fund against redemption of debentures or loans by which the business has been financed.

On a strictly scientific basis the contribution to this depreciation fund must begin on the very day the corresponding item is brought into beneficial use. But generally a greater capacity plant than would be needed in the early stages to serve the actual load requirements is installed and some time has to elapse before a reasonably large load is built up. There can, therefore, be no objection either to a complete suspension of, or a reduction in, the rate at which depreciation is to be allowed during the first four years provided that within the first eight years (as an outside limit) the correct total depreciation on the straight-line method is made. Till the time this limit of depreciation is reached, the dividend to the shareholders is restricted to a nominal figure, say, not more than 4 per cent. per annum.

For the provision of depreciation, personally, I should recommend the straight-line method. In my opinion, the whole amount should be reinvested in the business. It is unnecessary to add interest for this portion of the investment. It is a waste of accountancy labour since, if interest were allowed and changed to general revenue, the annual provision for depreciation reserve would have to be decreased by the amount of the interest. It may be prudent to invest, say, 10 per cent. of this reserve, in safe liquid securities outside the undertaking to be available in the case of emergency or unexpected renewal or in the event of a breakdown. But this would be unnecessary if the whole of the contingency reserve were invested in safe liquid securities.

The contingency reserve is an insurance provision against miscalculations and I consider that it is sufficient if this amount be allowed to accumulate up to 10 per cent. of the block account. This fund must be built up by way of an annual contribution averaging one per cent. of the block account. This fund should be invested in safe liquid securities outside the business so as to be readily available in times of need. It must, however, be commenced only after the initial development stage is over and the undertaking has advanced to reasonable maturity; that is, this provision should be made only from about the fourth or the fifth year after the provision under (*a*) and the minimum dividend are capable of being reasonably met from the revenues.

Intangible Assets and Stabilisation Reserve

Provision for writing off the cost of intangible assets should be carried to the 100 per cent. limit. It ought to be spread over till the time when the first option of purchase arises, for the preliminary expenses, goodwill, etc., which, though usually called "intangible assets" should, in the case of the public utility undertaking (with a fixed period of tenure) be considered as having value like any other property but valueless at the end of the first option period. In my opinion, it is unnecessary caution to seek to write off these expenses more quickly. A provision for this should also be commenced along with a provision for (*b*) the rate calculated on a straight-line basis depending on the period, etc.

Any reasonable provision for Stabilisation Reserve should be left to the judgment of the executive with a condition that this fund should not be built up to more than 15 per cent. of the total capital invested. The provision for this comes last after allowances have been made for the previous funds. There is no objection to a flexible contribution to this reserve according to the percentage of the net revenue.

Generally an electricity supply undertaking is a stable business unaffected by the changing market or world conditions, at any rate so far as domestic and local authority loads are concerned. In areas where industrial loads predominate, however, due to factors affecting the sale of the finished products of these industries the revenue of the electricity undertaking may fluctuate. Such concerns should give greater thought to this fund than those with more stable loads. But in any case, the fund need not exceed 15 per cent. of the total capital.

I quite agree that in a protected undertaking like that of a licensed public electricity supply, the return on the investment to the shareholder may be restricted to a reasonable figure. The fixing of the maximum rate of dividend alone will not solve the problem. For, if the operating expenses, including the management, contributions to reserve, renewals chargeable to the depreciation account, etc., are not regulated, the consumers' interests will not be adequately safeguarded. I would allow a dividend up to 10 per cent. per annum and also prescribe a limit (percentage) for the working and operating expenses based on a consideration of the following among other factors:—(i) On the service involved; (ii) on the capital invested in the undertaking; (iii) on the gross revenue; and (iv) on any features peculiar to each undertaking.

If by more vigilant, economic and efficient management an executive is able to reduce these expenses, his efforts should be encouraged by a bonus payment. All benefit accruing to the undertaking on account of natural development, however, should be utilised primarily for the benefit of consumers after providing for the reserves. It should not be impossible to fix a percentage with some margin for the main heads of expense based on the average capacity of any management with an extra advantage to greater enterprise and efficiency.

Strength of Tin-base Bearing Alloys

The International Tin Research and Development Council has issued a report of researches by C. E. Homer and H. Plummer into the "Mechanical Properties of Some White Bearing Metals and Other Tin-base Alloys at Various Temperatures." This paper (No. 57) gives data about tensile and Brinell tests on typical tin-base bearing metals and on alloys made by adding cadmium. Up to 3 per cent. addition of cadmium improves the strength and hardness, but there is a loss of ductility. The extra strength due to the cadmium is retained after heating, although these alloys, like nearly all the others examined, lose a definite proportion of tensile strength at a given temperature. Alloys of tin, copper and cadmium without antimony appear to have no useful properties which cannot be obtained more easily in other alloys. In a second technical publication (No. 58) H. Greenwood has examined the tensile behaviour, at temperatures up to 175 deg. C., of typical tin-base bearing alloys, with additions of lead and cadmium. As the temperature rises the maximum stress and yield point fall fairly uniformly while elongation and reduction in area increase. Cadmium markedly improves tensile strength of the alloys when cold but is of little benefit when they are hot, and the effect of 4 per cent. of lead, although slightly beneficial when cold, is reversed at the higher temperatures. Copies of these publications may be obtained, free of charge, from the Council, 378, Strand, London, W.C.2.

Heating a Social Centre

648 kW of flood panels and low-temperature tubes controlled automatically

A SOCIAL centre has recently been inaugurated at Slough, Bucks, to cater for diverse adult recreational activities and provide varied forms of juvenile instructional facilities. It is conducted somewhat on the lines of a sectional subscription club, employés of industrial works on the trading estate enjoying preferential membership terms.

The initial cost has been largely defrayed by contributions from benefactors and factory owners, with grants from local government and educational authorities in respect of the juvenile sections. The buildings have been designed and constructed by Slough Estates, Ltd., in such a way that they can be quickly and cheaply converted into three detached or six smaller factories should any such need arise.

In each case the two-storey front block provides office and similar accommodation, while behind are large single-storey twin bays with factory type glazed roofs. They are sub-divided internally by partition walls into rooms of differing sizes, with or without false ceilings according to requirements, and the whole is electrically space-heated on a liberal scale.

The equipment has been supplied by Unity Heating, Ltd., and the aggregate loading is 648.3 kW. At least 8,055 ft. of low-temperature tubular heaters has been installed, with a total loading of 483.3 kW. Uniformity has been preserved, though requirements are, of course, governed by the size and shape of the apartments. For instance, in corridors, single and twin tubes are attached to one side wall only, whereas in the larger rooms banks of three or four horizontally parallel tubes are fixed end-on in floor brackets round the skirting of all four walls. A typical arrangement in the smaller rooms of the front blocks is to allow 23 kW each for the ground and first floors, say 380 ft. each divided into 38 lengths and regulated by twelve thermostats. The heavy gauge steel tubes are of circular cross section and contain flexible frames for the nickel-chromium alloy elements. At the standard loading of 60 W per ft. a 5 ft. length of tube will liberate 1,022 B.th.u. per hr.

In addition, 132 "Unity" flood heat radiators have been provided; their aggregate load is 165 kW. In the small and large concert halls and billiards room they are suspended by chains from the roofs in symmetrical evenly spaced rows. In the juvenile classrooms, which are divisible by folding partitions, there are non-central pendants as well as both wall and corner brackets fixed at an appropriate angle.

These flood radiators are especially suitable for rooms subject to a high degree of ventilation or provided with large areas of glass. They operate at a surface temperature of 400 deg. F. and their radiation efficiency is said to be over 80 per cent. With a 25- by 13-in. element loaded at 1,250 W about 4,284 B.th.u. per hr. is radiated.

The heating circuits are controlled automatically by means of 142 thermostats, mostly wall-mounted and equally spaced. In thirteen cases double contact "suspension-stats" are employed, which actuate single- and triple-pole 50-A and 100-A contactor gear (of Reyrolle make to exclusive Unity design) totally enclosed in cast-iron boxes for wall mounting, and provided with two-way and "off" local key switches.

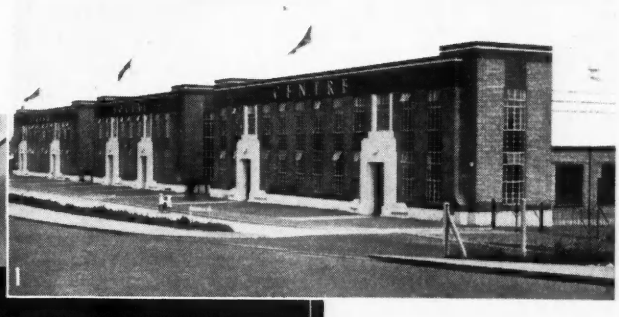
In general, three-, four- and five-way d.p., 20-A and 30-A distribution boards, together with three-way 20-A t.p. fuseboards with neutral link, are wired back (*via* the contactors where necessary) to 40-, 60- and 100-A t.p. switch-fuse sets with neutral link. These are, in turn, fed from 200-A t.p. and neutral bus-bar chambers in each block, controlled by a t.p. air-break or oil switch.

The incoming a.c. supply is at 260 V, 0.5 sq. in. cables with four equal cores serving the heating circuits, which include twelve water heaters of a total loading of 69.5 kW in the two kitchens and several cloakrooms. There are two of 4 gal. at 500 W each, one of 8 gal. at 1,000 W, two of 12 gal. at 1.5 kW, two of 18 gal. at 2.25 kW and five of 300 gal. at 12 kW.

They are of the Unity thermostatically controlled type, providing water at 170 deg. F. The patented twin inner containers are of nickel silver with welded joints. The space between them and the rectangular outer casing is filled with granulated cork. A removable plate affords access to the interior without breaking pipe joints, while the heating elements and thermostats can be withdrawn without emptying the water.

There are two kitchens. One is used for instruction in the juvenile block, containing a 12-gal. water heater, an English Electric domestic type cooker, a "Homefyre" kettle and a single compartment B.T.H. refrigerator. The larger canteen equipment includes a "Magnet" cooker and 18-gal. water heater, a two-compartment B.T.H. refrigerator, a Lightfoot automatic ice-cream cabinet, two motor driven Horlick's beverage mixers, and an electrically actuated National cash register.

The kitchen controllers are of the 30 A "Memkuka" pat-



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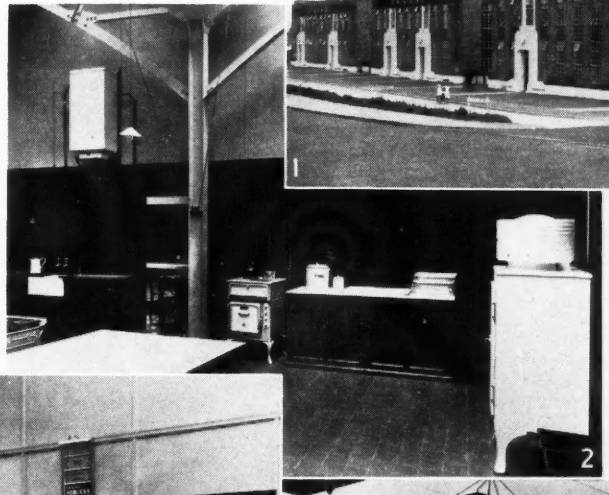
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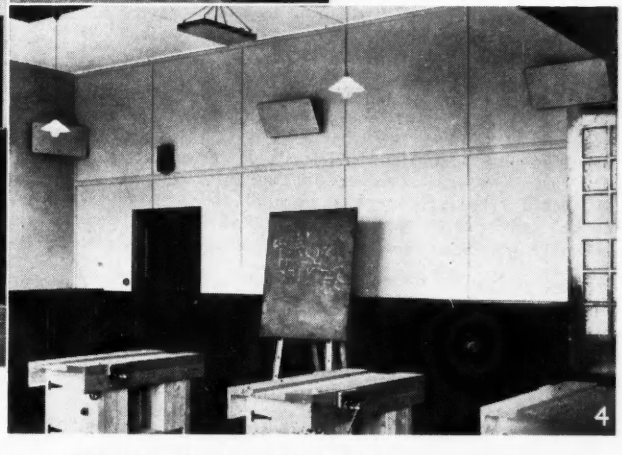
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1. Front view of Slough Social Centre. 2. Instructional kitchen in juvenile block. 3. Low-temperature tubular heaters in canteen. 4. Juvenile class room, showing flood heaters

The Commissioners' Fuel Returns

THE number of generating stations included in the "Analyses and Summaries of Fuel Consumptions and Units Generated" for the year ended December 30th, 1936, was 442. This was a decrease of sixteen from the previous year owing to the closing of twenty-seven stations, the putting into commission of six new and three stand-by stations, and the inclusion of two existing stations previously operated on a non-statutory basis. Separate sections of a station are treated as separate stations.

This return, which was issued by the Electricity Commissioners on Tuesday (Stationery Office, 1s. 6d.), comprises, in addition to an explanatory preface, seven tables. The first gives the number of stations in each of the grid regional areas, the second classifies them into thirteen groups corresponding to the kWh generated. The third table sets out particulars for each station (including traction stations and stations owned by certain non-statutory undertakings as well as those of authorised undertakings) relating to kWh generated and sent out, lb. fuel per kWh, thermal efficiency, m.d. and station load factor. Only the first two items are given for stations running for less than 2,400 hr. (including banking) and the others are given on a kWh-sent-out basis, and not on the kWh-generated basis adopted in previous years. For calculating thermal efficiencies one kWh is taken as the equivalent of 3,412 B.th.u.

The total amount of electricity generated in the 442 stations was approximately 21,650 million kWh, an increase of 13.98 per cent. on the 1935 figures. For this some 13,792,000 tons of coal and coke was consumed (10.5 per cent. increase) and 24,000 tons of fuel oil (1.2 per cent).

Table IV gives lists of steam stations with the lowest average fuel consumption and highest thermal efficiency in each of the groups in the second table. Average fuel consumption for groups for steam, gas, oil, with heat- and water-power stations (according to kWh generated) and an area summary are presented in the three remaining tables. Of the 20,530 million kWh sent out, 19,627 million came from 258 steam stations. Water power takes second place with 666 million from 48 stations, then come waste heat with 129 million from eight stations and oil engines with 60 million from 115 stations. About 45 million kWh was obtained from eight refuse destructors.

The average coal consumption per kWh sent out from steam stations was 1.57 lb., rising from 1.41 lb. for the thirty-four stations generating more than 200 million kWh to 6.45 lb. for the seventeen stations generating from 0.5 to 1 million kWh.

The lowest fuel consumption, 0.97 lb. per kWh sent out as well as the highest thermal efficiency, 27.63 per cent., was achieved by the London Power Co. at its Battersea station running on a 60.8 per cent. load factor. Dunston B (N.E.S. Co.), with 26.87 per cent., wrested second place from Barking B (County of London Co.), which returned 26.54. Clarence Dock (Liverpool Corporation) and Ironbridge (West Midlands J.E.A.) once more came fourth and fifth with 25.39 and 24.98.

Seventeen other stations belonging to statutory supply undertakings did better than 20 per cent. on the sent-out basis. These were, in order of merit: Spondon (Derby & Notts Co.), Deptford West (London Power Co.), Portishead (Bristol), Blackburn Meadows New (Sheffield Corporation), Thornhill (Yorks E.P.), Hams Hall (Birmingham Corporation), Kirkstall (Leeds Corporation), Barton (Manchester Corporation), Hackney Corporation, Sculcoates (Hull), Brimsdown B (North-Met. Co.), Portobello (Edinburgh Corporation), Ferrybridge (Yorks E.P. Co.), Kearsley A (Lancs E.P. Co.), North Tees (N.E.S. Co.), North Wilford (Nottingham Corporation), and Barking A (County of London Co.).

It would be pedantic to omit a reference to the Brighton station, which fails to qualify for the list only in the second place of decimals. Lots Road, of the London Passenger Transport Board, with 20 per cent, should also be mentioned. North Wilford station has markedly improved upon its performance of previous years. Although the number of kWh generated at Barking B was greater than in 1935, this did not enable it to retain first place for output, which went to Battersea with 996 million kWh (1,050 million generated). Actually, Barking A turned out more with 904 million at a load factor of 49.4 per cent., which, added to the 880 million of the B station, running at 68.2 per cent. l.f., made 1,783 million kWh from the site. Other stations with outputs exceeding 500 million kWh were Barton, Dunston B (which improved its load factor from 39.4 to 63.1), Hams Hall, Deptford West and Clarence Dock.

At the heads of their groups of steam stations having individual outputs of less than 200 million kWh, as showing the lowest fuel consumption per kWh sent out (thermal efficiency) were: Yoker (Clyde Valley Co.) and Tir John North (Swansea Corporation), Hackney Corporation, Hayle (Cornwall E.P. Co.), Battersea Corporation, Llanelly and District E.S. Co., Bury Corporation, Cambridge E.S. Co., Galashiels (Scottish Southern E.S. Co.), Sheerness & District E.S. Co., Weymouth Corporation, Weston-super-Mare Co., Penarth Co., and Melton Mowbray Co.

Thirty-one oil engine stations had efficiencies of over 20 per cent. Of these Yeovil, which heads the list with the remarkable figure of 31.3 per cent. for fewer than 6,600 running hours, Newcastle-under-Lyme (29.45), the Charing Cross Co.'s two stations at St. Martin's Lane and Short's Gardens (28.89 and 28.06), and Bridport (28.46), surpassed Battersea steam station's figures. The average fuel consumption for all oil-engine stations was 0.76 lb. per kWh sent out. For the five gas-engine stations it was 2.32 lb.

The regional area with the largest output was the South-East England, where 107 stations generated 7,485 million kWh of the total, representing an advance of 12.25 per cent. over the previous year. The biggest increase in output (74.28 per cent.) was in South Scotland, where new water power stations were put into commission. South-West England and South Wales improved by 23.08 per cent., while the Mid-East, Central and East England areas improved by rather more than 16 per cent. in each case. On the North-East Coast, where more than half the kWh derived from waste-heat stations is used (these contribute less than one-twelfth of the total kWh produced there) the increase was 14.22 per cent., compared with 13.11 in Central Scotland and 10.85 in North-West England and North Wales.

Two capital stations which both came into service on November 1st, 1936, *viz.*, Fulham and Kearsley B, are not included in the returns of thermal efficiencies. The first generated about 76 million kWh and carried 61,600 kW and the second generated 50 million kWh with 51,100 kW.

Heating a Social Centre (*Concluded from previous page*)

tern, while M.E.M. distribution gear has been largely used with some Crabtree switches. A separate 0.2 sq. in. cable with four equal cores serves the lighting (which is of the simplest kind) and accessory circuits, the general installation work having been carried out by the Slough Electrical Co.

Cables and wires supplied by the St. Helens Cable & Rubber Co., Ltd., have been installed throughout in conformity with the policy of dealing whenever possible with manufacturers within the trading estate, which is a statutory concern building and leasing factories of from 1,500 to 200,000 sq. ft. with all essential services, including electricity supplied from its own steam power station. The latter contains a 1,000-kW Brush-Ljungstrom set, a 3,000-kW Oerlikon set, two 1,000-kW Parsons sets and a 7,500-kW English Electric set, which is to be duplicated by next spring, making a total installed capacity of 22,000 kW.

Meanwhile, an endeavour is being made by Mr. S. Harper Bill, chief engineer, actively to interest factory owners on the estate in general space heating by electrical means, for which a simple flat rate of 0.5d. per kWh is offered without a kW charge or any restriction apart from an obligation to avoid the two hour peak period between 4 p.m. and 6 p.m. in winter.

This tariff should be attractive, especially when the absence of a fixed charge is kept in mind, together with the convenience of adaptability and economy of truly automatic control; while electric heating can be appreciably less costly to install than a centrally fired hot-water system, due principally to savings in builders' work and the smaller accommodation space needed by fuelless plant.

Battersea Extensions

At the same time as the Fuel Returns were made available, it was announced that the Central Electricity Board had given its formal directions to the London Power Co. to proceed with the extension of Battersea station, to which references have already appeared in the ELECTRICAL REVIEW. This will involve the construction of the second wing of the building to contain in the first instance a 100,000-kW unit comprising a 16,000-kW high-pressure turbo-alternator, a 78,000-kW low-pressure set and a 6,000-kW house set, together with a single boiler having a comparative capacity of 595,000 lb. per hr.

The steam conditions have not yet been stated, but from the particulars of the layout given above it would appear that steam pressure considerably higher than the 650 lb. per sq. in. is contemplated for the high-pressure section of the group. The new boiler will be much larger than any now installed in a public generating station in Great Britain. Comparisons with the Port Washington station of the Milwaukee Co. in the United States suggest themselves. The estimated cost of the extension is approximately £1,500,000, and the unit is expected to be ready for the winter of 1939-40.

Scientists at Nottingham

The B.A. annual meeting

THE Annual meeting of the British Association for the Advancement of Science opened at Nottingham on Wednesday evening last with the delivery at the Albert Hall of the presidential address by Sir Edward Poulton, D.Sc., LL.D., F.R.S. The proceedings of the thirteen sections into which the Association is divided commenced on Thursday morning, among the various items being the presidential address to Section G.—Engineering by Sir Alexander Gibb, G.B.E., C.B. F.R.S. The two addresses are dealt with below.

A symposium and general discussion on "X-ray Methods and Industry," was to occupy the whole of the morning session of Section A—Mathematical and Physical Sciences, the subject being introduced by Sir William Bragg, O.M., the President of the Royal Society. The contributions included one by Messrs. J. T. Randall and H. P. Rooksby on X-rays and the electrical industry, one by Dr. A. J. Bradley on X-rays and the permanent magnet industry and one by Messrs. R. W. Powell and W. A. Wood on recent work on mica-thermal and X-ray. In the afternoon the Section was to visit Ericsson's Telephone Works, Beeston.

Science and War

The address of the President was more entertaining than has sometimes been the case because it consisted almost entirely of extracts from the addresses delivered by his predecessors in the presidential chair over a long period. He connected up these quotations from utterances of great scientists of the past, showing here their points of agreement, there their points of difference, in a manner which afforded a both amusing and instructive history of evolutionary thought as recorded at meetings of the Association.

The general theme possesses little immediate interest for the pages of an electrical trade and technical journal, yet one may facetiously wonder what sort of a reception his address would have had if all those whose statements formed part of his story could have formed the audience to listen to it and to debate it. Assuredly, even the British Association itself could never have had so highly controversial, even heated, yet at times, merry a debate with so many brilliant minds contributing. Perhaps a subject of wider interest is that with which the address came to a fitting close, for it concerns not only scientists throughout the world but the peoples of all nations who have come to regard scientific achievements as a menace as well as a means of self-defence. Sir Michael Foster in his address at Dover in 1899, believed that the very greatness of the modern power of destruction was becoming a bar to its use and bade fair to put an end to it. French and British scientists fraternised on the occasion amid the disturbed state of affairs due to the Dreyfus *affaire* and we were present at a debate on the internationalisation of science at which the view seemed to be held that these scientists loved one another so dearly that they would never kill each other scientifically. A report of the meeting appeared in the ELECTRICAL REVIEW for September 22nd, 1899.

Presidents of later dates—Schuster in 1915 and Thorpe in 1921, supported this view, but Sir Edward, glancing farther back, quoted a meeting in 1858 when Sir Edward Owen, referring to the transatlantic telegraph expressed the confident hope that this and other applications of pure science "will tend to abolish wars over the whole earth." That was in 1858. But the B.A. does not despair, and Sir Edward added that nearly eighty years after "with all the terrible disappointments, there has been great progress and a time will surely come and may it come quickly, a time which shall prove that the visions of the young and the dreams of the old were prophetic of a glorious reality."

Meanwhile, we are in 1937, with bloody history being made with scientific implements in Spain and the Far East.

Research in Engineering

In his presidential address to Section G—Engineering, Sir Alexander Gibb traced the growth of modern research. He divides research into two categories. The first is true fundamental research, *e.g.*, splitting the atom or extremely low temperature investigations. No one can say who will benefit by them, or how, and this type must be financed by endowments and gifts. The second, applied research, is the one that affects engineering. The results become immediately available. This type also depends on endowments and Government support; like fundamental research it finds its home in universities where there is still opportunity for individualism.

After mentioning the encouragement of research as one of the objects of the foundation of the Institution of Civil Engineers in 1918, Sir Alexander referred to the first Government grant, in 1850, to the Royal Society for the promotion of scientific inquiries.

However, original research long continued to be mainly the work of individual scientists and industry failed to realise its value. Engineering, which started as an art, developed into empirical practice and has become an applied science, but Sir Alexander considers that it has not kept pace with science.

Greater progress has been made abroad and this remained true even in the early years of the present century. In Germany the Reichsanstalt and the Materials Testing Department were set up in 1872 (the former for both pure and applied science), technical colleges were founded to train research students, and research laboratories were arranged by large electrical concerns. One result of this outlook was the building up of the German dye industry by developing the discovery by Perkin of aniline blue in Britain in 1857.

Sir Alexander Gibb, F.R.S. [*Speaight*

In the United States, the National Academy, which was instituted in 1863 to cover all phases of national research, has been the forerunner of increasing activities. America has always been in the forefront in promoting international standardisation in engineering and co-operation in research—two matters that must run together. The National Bureau of Standards, whose publications are the means of making widely known many of the latest scientific discoveries, maintains close touch with the research departments of the universities and other institutions in every state. Industry and manufacture have taken a leading part in the research movement and the Mellon Institute represents a type of co-operative research peculiar to the United States; in this, membership is limited to one representative of each class of interest and private research is carried out on an exceedingly broad basis.

In Canada, the Dominion Government is active in the same direction. The National Research Council has in hand a wide programme and is also training a big body of research-minded engineers and scientists.

It was not until 1900 that research was recognised in Britain as a question of national importance. The scheme for the National Physical Laboratory had been drawn up in the previous year and the British Engineering Standards Association came into being three years later.

Government Assistance

An important step was taken when, as a result of joint representations made by scientific societies, the Department of Scientific and Industrial Research was established in 1915. This body covers an immense field of engineering work and also acts as a focus for linking up all research going on in the country by encouraging the formation of self-governing research associations which submit yearly reports. The Department, in addition to giving technical advice, contributes £1 per £1 subscribed by their members.

Of equal importance is the work of research bodies under the management of scientific institutes, while nearly all the universities now have research departments which not only carry out practical work but also act as training centres for research workers. Private laboratories are maintained by quite humble businesses as well as by the wealthier firms.

The increasing interest taken by industry in the subject in Great Britain is reflected in the steady growth of contributions by manufacturers to research associations. Thus in 1932-33, the amount was £167,000, but in 1935-36 it had grown to £232,000. However, industry still lags in support of the Associations, even in spite of Government liberality. The fear that new inventions may cause loss due to obsolescence of existing plant has sometimes damped enthusiasm for unrestricted research, but that is a short-sighted policy.

Co-ordination and co-operation have done much to link together the various elements, but there has been as yet no general national plan. Groups of unrelated bodies cannot be really effective. Centralisation is also required in publication of the results of research. A clearing house of engineering information is required and the Department of Scientific and Industrial Research could provide a nucleus for the service, but Sir Alexander maintains that engineering must work out its own scheme.

Belfast-Stranraer Radio Link

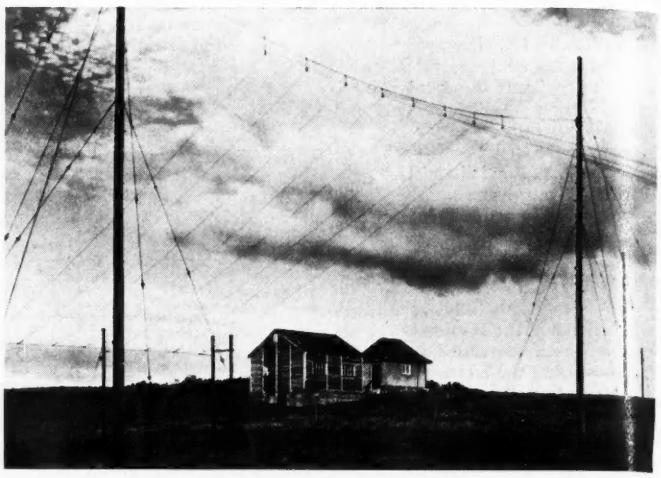
Nine-channel ultra-short-wave system inaugurated

NEW possibilities for long-distance communication facilities were opened up on Tuesday by the inauguration by Sir Walter J. Womersley, Assistant Postmaster-General, of the Belfast-Stranraer nine-channel ultra-short-wave radio telephone link. Single channel equipments of similar type have been in operation between Barcelona and Majorca since September, 1935, and a micro-ray service (wavelength 15 cm.) between Lympne and St. Inglevert was inaugurated in 1934, but this is the first application of a system wherein as many as nine telephone channels are provided simultaneously by a single radio link.

The equipment, which has been produced by Standard Telephones & Cables, Ltd., is designed for unattended operation, and is capable of complete remote control from the nearest telephone exchange. It is entirely mains operated, the only battery used being for the relay system. Portions of the equipment are duplicated. Diesel plant is provided as a standby.

To obtain an idea of the principle of operation of the transmitter let it be assumed that the input of channel No. 1 is supplied with sinusoidal tone of frequency f1 kc per second. This input modulates a channel-frequency oscillator having a frequency in the range of 150 to 300 kc per second, say, 155 kc per second, resulting in a carrier frequency of 155 kc per second together with upper and lower sidebands of (155+f1) and (155−f1) kc per second. If channel No. 2 be supplied with a tone input of frequency f2, this will modulate an oscillator having a frequency of, say, 165 kc per second, resulting in a carrier frequency of 165 kc per second and upper and lower sidebands of (165+f2) and (165−f2) kc per second. Similarly, channel 3 may have a carrier frequency of 180 kc per second, and so on to the ninth channel of which the carrier frequency might be 280 kc per second.

The bands of frequencies derived from the nine channels are now added together, producing in total a single frequency band extending from (155−f1) kc to (280+f9) kc per second. This total frequency band is now used to modulate the output of the transmitter having a carrier frequency of about 76,000 kc, and to produce a lower side-band from 76,000−(280+f9) kc to 76,000−(155−f1) kc, the carrier wave of 76,000 kc and an upper side band extending from 76,000+(155−f1) kc to 76,000+(280+f9) kc per second. This is the band of frequencies radiated.



Receiving and transmitting aerials at Portpatrick (Stranraer)

At the receiving station the second detector of a superheterodyne receiver reproduces the original side band extending from (155−f1) kc to (280+f9) kc. This band of frequencies is then applied to a bank of nine selecting circuits which are designed to serve the purpose of band-pass filters. The currents of frequency (155−f1), 155 and (155+f1) kc will be passed by the first filter to a detector circuit which delivers the original frequency of f1 kc to the first channel. Similarly, the whole band of frequencies will be split up, detected and delivered to the appropriate channel.

The carrier frequency is held constant by a crystal-controlled master oscillator, while the beating oscillator of the superheterodyne receiver is similarly crystal controlled.

This explanation covers the transmission of nine channels in one direction on a carrier wave of 76 megacycles approximately. For the reverse direction the circuits of the same nine channels are transmitted on a carrier wave of approximately 83 megocycles. To minimise interference between the transmitting and receiving waves, the plane of polarisation of the waves emitted by the transmitting aerial is at right angles to that of the waves received by the receiving aerial.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

A Would-be Consumer's Difficulties

On page 266 of your current issue under the heading "New Lighting Campaign" you state "There are still a surprising number of homes without the benefits of electric lighting." Perhaps the experience of an ordinary consumer attempting to obtain this benefit may be of interest.

On June 21st last, having been transferred by the Post Office to this district, I submitted an application form to the local supply company for a supply to my house and in a covering letter stated that I would be moving in on June 30th and offered to send a cheque for the quarterly payment. I received a letter notifying me of the quarterly fixed charge and then it would seem I was forgotten.

After about three weeks, as I had heard nothing further, I commenced to make 'phone calls but could obtain no satisfaction; in fact on one occasion a person tried to inform me it would be necessary to obtain Air Ministry sanction to extend the power line along a road which has already a telephone route and power wires along it. Finally I was informed that as my supply would necessitate a three-pole extension and the company did not think my load sufficiently heavy, it had considered requesting me to pay part cost but would now waive this and proceed with the wayleaves—this after five weeks.

The present position, after ten weeks, is that the wayleaves have been granted but it would seem that no further action has been taken by the company while local inquiries indicate that it will be hopeless to expect a supply under another month or six weeks at the rate at which the company works.

This is an £1,100 type of house and my application form asked for a supply for ten 100-W lamps (as I like good illumination) a 1-kW fire and an electric wash-boiler to be purchased from the company. I did not trouble to include the usual domestic appliances such as vacuum cleaner, iron and wireless set as the total wattage is so small. Moreover an electric cooker was not included as it was considered that the price per unit was high when compared with the charge of the Luton Corporation from whom my previous supply at Dunstable had been obtained, and an efficient cooking range was fitted in the house.

During the recent hot spell, however, the heat of the range proved rather trying and the probability is that had the mains been connected a cooker would have been ordered. The company has therefore lost a sale while I have lost the benefit.

August 31st. W. E. HAWKINS.

Cooking Utensils

With regard to Mr. H. S. Trinder's letter in the current issue of the ELECTRICAL REVIEW, it occurs to me it might be interesting to see how much of the superior boiling powers of the cast iron saucepan when used on an electric hotplate are due to its being black as opposed to the polished surface of aluminium. If a sheet of tin and a slate are placed in front of an ordinary fire, the slate will get hot very much quicker, due to the tin's reflecting power. This is a variation of a lecture table experiment which I remember seeing as a very young boy.

ROBERT C. PIERCE.
(Cambridge Electric Supply Co., Ltd.)

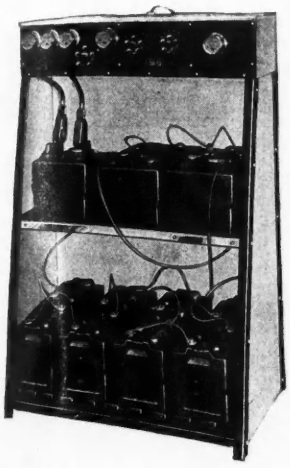
Cambridge, *Aug. 27th.*

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Battery Chargers

A new range of battery chargers, known by the name of "Handy," has been introduced recently by GORDON EQUIPMENTS, LTD., 25, Milton Street, London, E.C.2.



The Gordon type 6RTD charger and testing stand

Model 6B is designed for garage and radio use. It will charge from one to six 6-V starter batteries. A table charging rack with a 6-A charger (6DR) is also available, complete with clip "jumpers"; a more expensive model will charge six 6-V batteries at 12 A.

Other newcomers are the 6- and 12-V RTD series comprising rack, charger and discharge tester. They are fitted with four discharge meters and are especially useful in garages as they enable the car owner to ascertain the condition of the individual cells of his battery before and after charging.

The feature of all these chargers is that there are no resistances to vary the current, control being effected by transformer tappings.

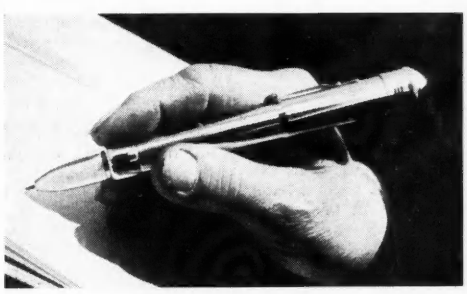
A "Rawlbolt" Improvement

The RAWLPLUG CO., LTD., Cromwell Road, London, S.W.7, inform us that there are now thirteen sizes of each type of "Rawlbolt," and a collar is now fitted which both improves the appearance by taking up excess protrusion of the bolt and facilitates the fixing of articles of varying thicknesses. There are still two types of "Rawlbolt" obtainable; in one case the expanding member is part of the bolt itself and in the other it is detachable.

Internally Silvered Lamps

Mushroom shaped lamps, with the upper part silvered internally to form a reflector and the lower part in satin finish or clear, are now being supplied by "BEFANTEE" ILLUMINATIONS, LTD., 88, Cromwell Road, London, E.C.1.

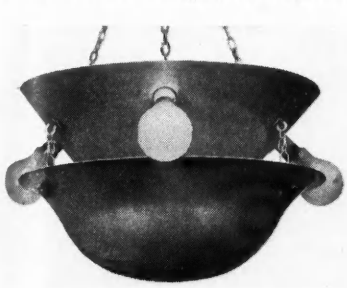
The lamp is guaranteed for an average life of 1,500 hr., while the company claims that more than double the light from an ordinary lamp is registered by lightometer readings directly below the lamp, a useful factor in offices where the light is required to be concentrated directly on to a desk. These lamps are known as "Silvaray" reflector lamps.



An electrical novelty: an illuminated pencil

An Air Purifier

The original air purifier and deodoriser unit of H. ASHTON, Bull's Head Passage, Manchester, 4, has been redesigned so as to be suitable for use in private residences, clubs, &c. It can be obtained in glass for suspension, as a floor standard or as a table fitting.



The Ashton air purifier

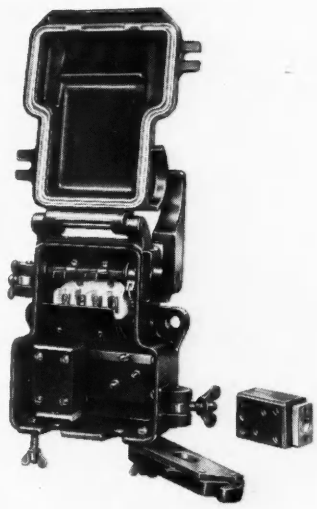
Water is raised from a reservoir and by centrifugal force converted into spray through which impure air is forced by a fan. Disinfectant or perfume can be added to the water, and the lamps can be arranged to give various lighting effects.

A small 8-in. fan is placed in a cylinder inside the reflector; this has an extended spindle carrying a wooden cone which dips into the water in the bowl. Clean air is expelled between the bowl and the reflector. The loading of the purifier is between 30 and 40 W.

A Cargo Connection Box

For controlling portable cargo lanterns on board ship a new connection box unit has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. Particular attention has been given to the necessity for withstanding rough handling and the corrosive effects of salt water.

The switch is of the d.p., double-break knife type, of 20 A capacity. The fixed contacts and terminals consist of substantial brass blocks with phosphor-bronze embracing contacts, mounted on a strong vitreous porcelain base. The moving portion comprises two "U"-shaped, hard-drawn, copper blades firmly secured to a micanised steel shaft, and the movement is q.m. and b. This switch controls two separate plugs to which the flexible cables are wired.



The G.E.C. cargo connection box

The fixed portion of the plug circuits consists of hard-drawn brass pins which are fixed to an ebony "Sindanyo" base. The removable plugs are lignum vitæ blocks containing the brass sockets which engage the fixed pins in the switchboard, this arrangement dispensing with projecting pins on the plugs. A suitable cable grip is provided in the ends of the plugs.

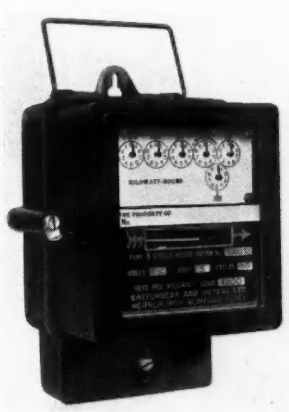
The whole interior is contained in a strong cast-iron box, and when the plugs are not in use the end of this is closed with a hinged plate, making the unit watertight. Earthing is provided by means of substantial earth pins (connected to a common earth bar) in the switch box and an earth socket in each plug, which makes contact with the earth pin before the circuit pins and sockets become engaged. The operating handle of the switch is interlocked with the cover of the switch box, ensuring that the plugs cannot be inserted or withdrawn when the circuits are alive. The boxes fully comply with the requirements of the Home Office for employment on board ship or in factories.

A House Service Meter

Newcomers into the meter-manufacturing field are SWITCHGEAR AND METERS, LTD., Hornchurch, Romford, Essex, and their initial product is the type A single-phase watthour meter which is made in standard sizes up to 100 A.

It is an all-insulated meter, although a metal case can be supplied when required. The base and terminal block are moulded in one piece and the removable terminals are of solid brass. Two of the three fixing holes are in the terminal block and are inaccessible when the terminal-block cover is in position. Mounted on its stout cast-iron frame, the whole element can be readily removed without affecting calibration.

The rotor and index can also be removed separately without disturbing adjustments, and locating studs ensure correct alignment and mesh upon replacement of the index. The removable oil-bath top bearing has a hard



Type A single-phase watthour meter

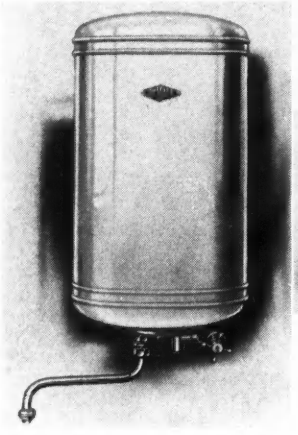
polished wire protruding from its mount into a cap on top of the spindle, while at the bottom bearing a hard steel ball rotates in a synthetic sapphire jewel. The heavy gauge of the series coil and the low speed of the rotor permit running on triple full load without undue heating and excessive friction. The unusually wide registration range is from 1/20 to triple full load. Because the rotor is pivoted at the centre of gravity the meter will run satisfactorily at 30 deg. from the vertical.

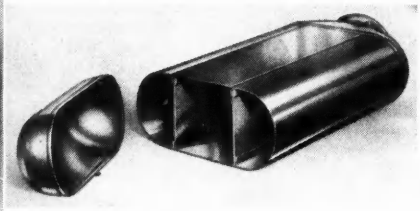
The "Alnico" one-piece steel brake magnet is mounted on a rigid steel platform marked to indicate plus and minus percentages. Micrometer adjustments are provided for both low load and power factor.

An Unusual Water Heater

To cater for the demand for a water heater having a minimum projection from the wall, AIDAS ELECTRIC, LTD., Sadia Works, Park Avenue, North Circular Road, London, N.W.10. has introduced a new model designed to decrease the projection and yet retain the mechanical strength of the cylindrical shape enabling the heater to be subjected to a pressure test of 86 lb. per sq. in.

Actually the heater has flat sections with semi-cylindrical ends, giving very pleasing proportions and virtually dividing the container into three sections. The inner container is of a similar shape and is strengthened by interior bracing. The side walls of the rectangular section do not extend the full height of the container, allowing free circulation between the outer and inner sections. The heating elements are fixed vertically in the centre portion to promote good circulation and facilitate temperature recovery.



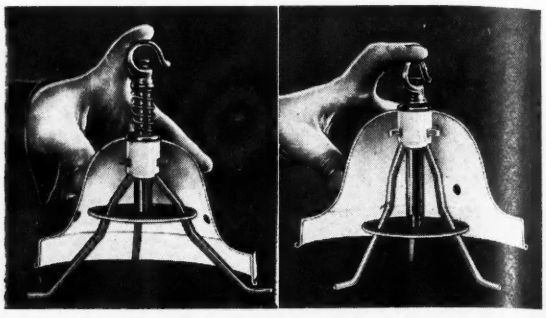


The new "Sadia" water heater showing construction of inner tank

Apart from the shape, the heater conforms to the same standard as the cylindrical "Sadia" heaters, the baseplates are interchangeable and the same elements and thermostats are used. The curved sides of the tank allow the supporting brackets to be placed within the overall dimensions of the heater and they are therefore invisible from the front.

A Screwless Gallery

An interesting introduction by FALK, STADELMANN & Co., LTD., 83/93, Farringdon Road, London, E.C.1, is a screwless gallery for the suspension of lighting fittings; it is made with a neck measuring from four to six inches in diameter.



The "Fast" screwless gallery showing the open and closed positions

The shade is held by the pressure of three "legs" against the underside of the gallery. When it is desired to release the shade it is only necessary to press the spring-loaded hook and the shade will drop away.

This method of fixing makes for rapid removal for cleaning and also allows freedom for expansion due to heat. The actual weight of the globe does not fall directly on the spring, as this only serves to hold a guide plate upon which the strain falls.

A Telephone Company's Developments

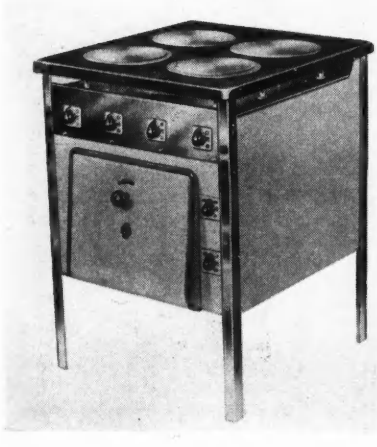
AUTOMATIC INTERNAL TELEPHONES, LTD., 30/34, New Bridge Street, London, E.C.4, announces the introduction of synchronous electric wall clocks on rental, hire-purchase or outright sale. They can be obtained with numerals or block chapters instead of figures. The same company has also introduced a new rotary line selector telephone, moving a pointer and pressing a button sufficing to call a subscriber.

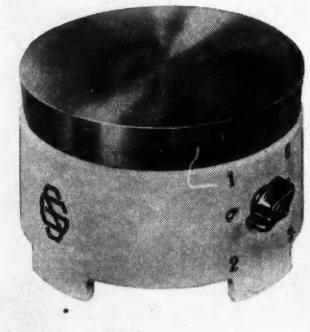
Finnish Domestic Cooking Equipment

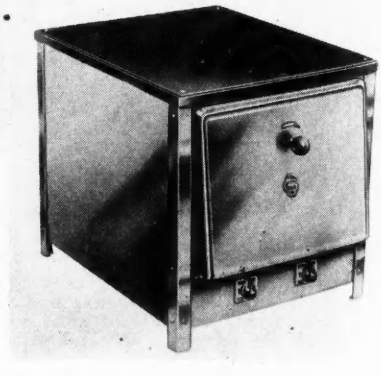
IN the past two or three years Finnish electrical manufacturers who had previously concentrated their activity almost entirely on large equipment, have turned their attention to the domestic field. The Finnish concern, Gottfried Strömberg, is producing some interesting kitchen equipment. The cookers are generally standardised with four plates, although some models are made with two or three, the whole construction being in stainless steel, enamel being a special finish to order.

The type which seems to be preferred by Finnish consumers is a small range with four plates and an oven. All four of the plates are designed with plug and jack arrangement to permit the plates to be removed or changed. Two sizes of plates are provided, one 7.09 in. and the other 8.66 in. in diameter. In order to make these interchangeable, all the spaces in the top of the range are made of sufficient size to accommodate the larger plates, while rings which can be fitted into place adapt the spaces for the smaller ones. Each size of plate is also made in two capacities, the smaller being either 1 kW or 1.2 kW, and the larger 1.5 or 1.8 kW. In this way the capacity of the range is made to vary with the particular requirements of each customer. The oven has top and bottom heating, both elements being rated at 750 W and provided with a separate control switch placed at the side of the oven, the switches for the heating plates being at the top. The interior of the oven is also of stainless steel.

An interesting point about the ranges is the relatively small size of the heating plates. This has been calculated after considerable experiment with a view to reducing the heat losses to a minimum. The small size of the element permits it to be entirely covered by the saucepan. This ensures that there is no loss of heat from an uncovered area round the sides of the vessel.







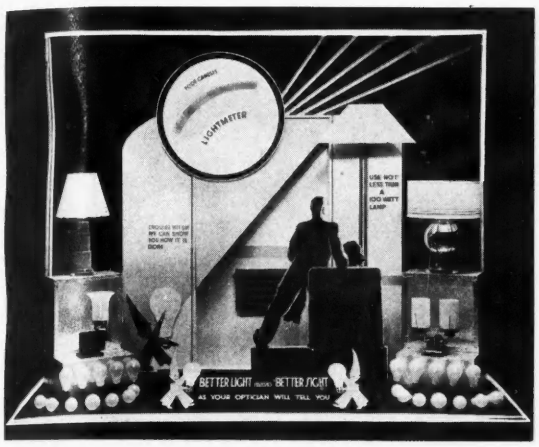
Three typical examples of Finnish domestic electrical equipment made by Gottfried Strömberg: A four-plate cooker, a hot-plate and an electric oven. They are all made in stainless steel

Better Light—Better Sight

Details of the new season's campaign

FULL particulars are now available of the plans for the E.D.A.-E.L.M.A. "Better Light—Better Sight" campaign which is to be continued during the coming lighting season, following its successful inauguration last October. As mentioned in our last week's issue, the effectiveness of the scheme will be increased by the co-operation of two further E.L.M.A. members, Philips Lamps, Ltd., and Crompton Parkinson, Ltd.

While the general objects of the campaign remain the same, the character of the national advertising is to be changed considerably. Greater stress is to be laid on the application of light, emphasising the importance of correct light distribution as well as the correct amount and showing some of the dangers of inadequate illumination side by side with examples of the benefits of adequate and properly controlled lighting. During October and November advertisements will appear continuously in thirty-three newspapers and magazines, periodical



A display unit for small windows or interior use

advertisements also having been arranged in a number of other journals.

To inaugurate the campaign, area trade conferences, at which Mr. V. W. Dale (E.D.A.) and Mr. W. J. Jones or Mr. H. Lingard (E.L.M.A.) will outline the scheme, have been arranged as follows:—London, September 30th; Birmingham, September 28th; Bradford, September 29th; Bristol, September 21st; Edinburgh, September 10th; Manchester, October 1st; Newcastle, September 9th; Belfast, date not fixed; Norwich, September 28th; and Tunbridge Wells, October 7th.

Lamp dealers are urged to link up their windows with the campaign for at least a fortnight during the autumn and for this purpose two excellent displays have been arranged, one adaptable to any window from 8 ft. to 20 ft. in width and the other designed for small windows or for interior displays. Attractive posters, in 120 in. by 80 in. and 30 in. by 20 in. sizes, are also available showing a happy looking schoolgirl with the wording "Give your children good light: electric lighting is cheap." The same design appears on poster stamps for affixing to correspondence, account forms, envelopes, &c.

This effective design appears on the new posters and poster stamps

Photographs of various rooms of a modern house illustrating up-to-date practice in lighting arrangements and fittings are included in a 16-page folder suitable for enclosure with accounts. On the cover is a picture of a baby with the reminder that "Seeing begins at home."

To attract the children's interest in lighting matters a novel competition is being organised. Entrants, who must be under sixteen years of age, have first to colour a series of room interiors in outline on paper and then stick suitable lighting fittings in appropriate positions. It is proposed that the competition shall be conducted locally by each individual circle, committee or undertaking, and it is left to them to decide the number and value of prizes offered.

A special appeal is made to members of the two associations to supply their staffs with light meters, to equip their showrooms with light demonstration units and charts, to organise light measurement tours, and to deliver special lighting lectures and demonstrations, for which helpful notes are available.

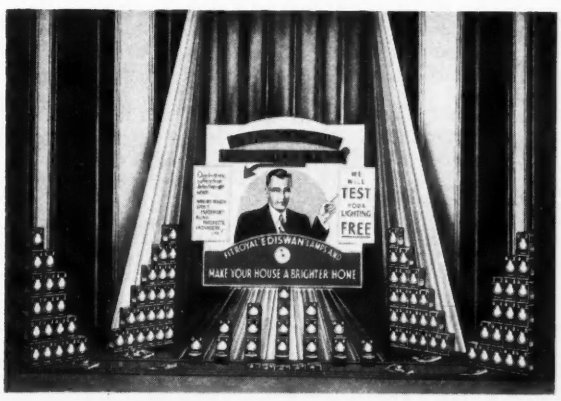
More Lamp Publicity Schemes

A SCHEME for inspecting consumers' premises, testing light output and placing of lamps, and advising any desirable alterations in existing lighting equipment is a novel feature of a new publicity campaign being introduced by the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2.

Full details of the proposals are being sent to electricity supply undertakings and lamp dealers in attractively coloured folders. Record cards are to be provided on which particulars of the position, type, and wattage of lamps installed in each room are noted, the consumer being asked to bring the card for reference when buying new lamps. The seller will keep a duplicate record with notes of the dates on which lamps are supplied and will thus have a useful check on their life.

This light testing plan is designed to link up with the E.D.A.-E.L.M.A. "Better Light—Better Sight" campaign and with the company's own publicity materials and literature, through all of which runs the theme "Is wrong lighting ruining your eyes—one in three suffers from defective sight—we will test your lighting free."

"Relma" and "Briton" display pieces



A simple yet effective "Ediswan" window display

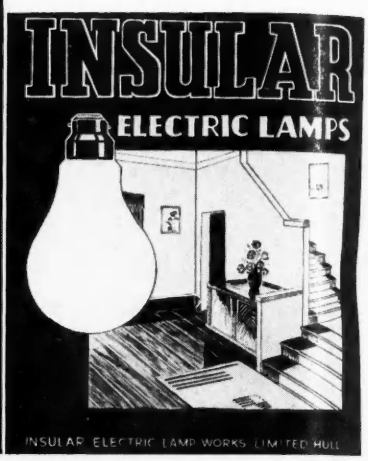
For use in conjunction with the scheme a simple yet effective window display has been arranged. In the striking centrepiece, which measures 3 ft. 9 in. long by 3 ft. 4 in. high, a realistic neon effect is given by illuminated lettering at the top. Plenty of assistance is forthcoming in the way of leaflets,

window bills, &c. In addition to the 52-page illustrated general catalogue, a handy folder gives prices and particulars of the more popular types of lamps.

JOHN ISMAY & SONS, LTD., Roden Street Works, Ilford, are making a feature of window dressing, and this service will be available to all "Relma" and "Briton" dealers throughout the country. "Briton" lamps are now a "Class B" type made only in 15- to 150-W sizes, a complete range of "Relma" lamps being produced, however. Two new "Relma" showcards are available. In the larger a representation of a lamp with the blue and yellow "Briton" showcard, and measures about 15 in. by 9 in.

A neat showcard available from the UNIVERSAL LAMP CO., LTD., Universal House, 82-89, Great Eastern Street, E.C.2, provides an attractive setting for the display of representative examples of "Britram" clear and pearl lamps. Measuring 21 in. high by 17 in. wide, it has a blue background with red lettering, the word "Britram" illuminated from behind standing out boldly on a convex projection at the top.

The corner of an entrance hall in a house brightly illuminated by an "Insular" electric lamp is the subject of a 10 in. by 12 in. blue and yellow showcard prepared by the INSULAR ELECTRIC GLOWLAMP WORKS, LTD., New Cleveland Street, Hull. Covering the "Supalite" range, which includes anti-vibration traction lamps, is a representation of a lamp and carton with the words "Supalite for Super Light."



The Atlas "Dispenser," and "Britram" and "Insular" showcards.

wording "The world's most economical lamp" and "Long life" forms the front portion; behind is a panel with slots to display actual lamps. A circle in the background is filled with lead foil to give the effect of a silver sun. Bright green, yellow and black are the striking colours used for this, as well as for the general catalogue and a smaller showcard. The latter is the same size as an attractive

Four feet in height and with a base measurement of 18 in. by 16½ in., the "dispenser" display stand distributed free by the ATLAS LAMP WORKS, LTD., 105, Judd Street, W.C.1, holds 150 lamp cartons. At both ends of the top four shelves are sockets holding lamps of the wattage displayed there. The figure of "Bob Atlas" is incorporated in the top panel. A wide range of attractive printed matter is also available.

The Australian Electric Refrigerator Market

From a Correspondent in Melbourne

THE geographical position of the Southern States of Australia suggests a lucrative field for manufacturers of refrigerating equipment. The earliest efforts to develop the market were made by Australian wholesale distributors on their own account Subsequently, a more intensive exploitation was undertaken by foreign manufacturers themselves, either through resident representatives or selected wholesale distributors. The latter, in many cases, also acted as representatives.

The development of a local refrigerator industry was a natural consequence, and to-day household electric refrigerators are made, or assembled, by several firms in Australia, some of which are of considerable standing. The market, however, being entirely domestic, has not warranted the development of concerns exclusively devoted to the production of refrigerators, and the result is that Australian makers of electric refrigerators are not entirely dependent on this business, which, as in some other countries, is substantially seasonal. Australian electric refrigerator cabinets are practically all white and are generally finished with a coat of baked enamel, although some other protective coatings are available. Refrigerator hardware is reported to be largely chrome-finished and is usually of modern design.

Sizes and Prices

The sizes of electric refrigerators generally sold in South Australia are of four recognised capacities. The smallest, of 3 cu. ft., is being widely sold, but apparently in decreasing volume. The next size (4.5 cu. ft.) is reported to comprise 50 per cent. of all retail sales. The third size (5.5 cu. ft.) seems to be responsible for a further large proportion of the sales, while the refrigerator of 7 cu. ft. capacity accounts for the rest.

It is estimated that Australian production to-day accounts for about 70 per cent. of all retail sales, but this is not expected to increase materially in the future. Despite the effect of the protective Australian tariff, figures are kept remarkably low. Current retail prices of refrigerators of 4.5 cu. ft. capacity average £59 10s. For the next largest size the average retail price appears to be in the vicinity of £65, while the 7-cu. ft. electric refrigerator is available at £75. At times of seasonal sales, however, it is natural to expect lower prices to be realised.

Australian users of refrigerators are tending to insist on those types of machines which are comparatively noiseless in operation and of construction and operation which suggest an absence of servicing problems. For these reasons there appears to be a growing interest in what are known as "sealed units."

At the moment it is reported that all electric refrigerators being assembled in Australia use sulphur dioxide as a refrigerant. Most of the American refrigerators seem to have changed to methyl chloride, and it is quite possible that the use of methyl chloride in Australia will develop in the near future.

The British Preferential Tariff

In connection with retail prices it should be mentioned that electric household refrigerators are dutiable, and that while some distributors can operate on a cash-against-documents basis, other manufacturers find a wider market by offering terms of thirty days. The general tariff on refrigerators and refrigerator parts, *ad valorem*, is 75 per cent. and the British preferential tariff is 55 per cent. As 10 per cent. is added to the invoice value before the duty is computed thereon, the actual net duties are 82½ and 60½ respectively. In addition, there is a primage duty of 10 per cent. under the general tariff and 5 per cent. under the British. The British preferential schedule is further favoured by the exchange adjustment proposals which, at current rates of exchange, provides for a reduction of one-quarter of the duty, or 12½ per cent. off the value for duty, whichever is the less.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Transport Workers' Wages

An increase in wages costing the Bolton Corporation £10,000 a year is being sought by its passenger transport employés. The application, which has already been sent to the Joint Industrial Council, asks for a new agreement giving an all-round increase of 4s. a week and an improvement in working conditions, especially with regard to spread-over duties. All employés of the Corporation Transport Department are affected, the number being 860.

Five hundred bus and tram drivers and conductors employed by the Sunderland Corporation decided at a midnight meeting on August 27th to refer alleged grievances to an inquiry by the National Joint Industrial Council. The men, who previously threatened strike action to begin on August 28th, are demanding payment at the rate of time-and-a-half for overtime during the illuminations period, but this has been rejected. They are also complaining of spread-over of hours, speeding up of services and the alleged violation of the seniority rule. It is declared that an agreement regarding the number of entrants into the Department has also been broken. Negotiations with the Sunderland transport manager (Mr. C. A. Hopkins) have been carried out by Mr. W. Kitching, Wear organiser of the General and Municipal Workers' Union.

New Chocolate and Confectionery Exhibition

The much greater space available for this year's Chocolate and Confectionery Exhibition—it has the honour to be the first function held at the new Earls Court buildings—has enabled displays to be considerably more elaborate and shown to much better advantage. Electrical interest centres largely on the multitude of packing and wrapping machines shown. Many of these have been still further speeded up and incorporate ingenious devices for economising in materials. New and improved types of chocolate mills, beaters, mixing, rolling and filling machines, are to be seen in large numbers, nearly all electrically operated by self-contained motors. One of the most comprehensive exhibits of machinery is to be seen on the stand of Baker Perkins, Ltd., whose display has been prepared in conjunction with its associates, the Forgrove Machinery Co. and Hansella, Ltd. Other exhibitors of electrically operated equipment are Rose Bros. (Gainsborough), Ltd.; Bartlett, Norman, Ltd.; Benhil Machinery Co., Ltd.; Block & Anderson, Ltd.; Bramigk & Co., Ltd.; Wm. Brierley, Collier & Hartley, Ltd.; L. C. Claridge; Ewart & Matts, Ltd.; F. Jahn & Co.; Max Loesch; Low & Duff, Ltd.; and Paillard & Benoit (S.I.S.) Wrapping Machines, Ltd. The exhibition continues until next Thursday.

German Lamp Prices

The Berlin correspondent of the *Financial Times* reports that the leading manufacturers of electric lamps in Germany are reducing their prices for the ordinary types of lamps by between 5 and 8 per cent. This is the second price reduction in recent years, the last taking place in September, 1935, when the prices for ordinary lamps were reduced by 1 per cent. Electric lamps in Germany now cost about one-third as much as before the war.

Quarrying In Northern Ireland

The electrification of two quarries in Northern Ireland has recently been carried out by Crompton Parkinson, Ltd. The quarry of Kennedy and Co., near Portrush, is on an outcropping of the Giant's Causeway. Here a 100-h.p. motor drives the plant, which comprises two crushers, cone, elevating gear and screens. There is a further 30-h.p. compressor motor as well as a 2½-h.p. bellows motor in the blacksmith's shop. The elevator of the company's loading silos in Portrush harbour is driven by a 15-h.p. Crompton Parkinson motor. For the past twenty-five years the quarry has been exporting stone to England, and until this installation was made, the power was supplied by a suction gas engine. The change-over has proved advantageous in every way.

At R. J. Maxwell's quarry in Co. Londonderry, the machinery was supplied by Pegson, Ltd., and the power amounting to 143 h.p. in all, is from Crompton Parkinson motors. The main machines motor is a 75 h.p. "Klosd" type, and a 30-h.p. motor drives the Ingersoll-Rand compressor. This was an entirely new installation, the quarry only recently having been started. The resident engineer has expressed his satisfaction with the manner in which it has worked to date.

A Prize-winning Tableau

The accompanying illustration is reproduced from a photograph sent to us by Mr. A. J. Beckett, borough electrical engineer of Bridlington, and shows a comedy car which he entered in the carnival procession held at Bridlington on August 27th. This entry caused considerable amusement, the

Bridlington Electricity Department's entry in the recent local carnival procession

proper driver using his reverse gear a good deal, with the result that the onlookers were at a loss as to which was the correct front of the car, and quite a few thought it was some new type of electric vehicle. This entry was awarded the second prize in the comedy tableaux.

Runwell Hospital

In our description of this institution in our July 30th issue we mentioned and illustrated a 17-panel slate switchboard. Actually, we are informed by Turners Asbestos Cement Co., the board is of "Sindanyo" which the company supplied to the switchgear manufacturers.

Clesco Garden Party

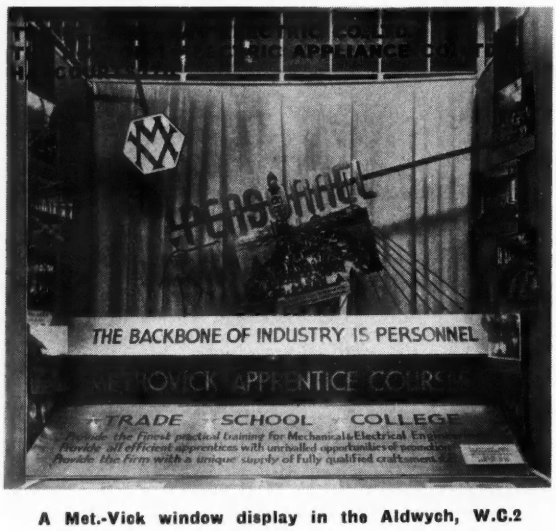
Special significance was attached to the twenty-first annual horticultural show and garden party of the Clesco Sports and Social Club (County of London Electric Supply Co., Ltd., and its associated companies), held at the Club's sports ground, Raynes Park, on Saturday last. Mr. A. R. Bacon was superintending his last horticultural show before his retirement as chairman of the club, a position which he has held for twenty-one years, and it was a fitting occasion for a presentation to be made to him from the directors and the Club in appreciation

Left: Sub-station at Kennedy's quarry, Portrush. Right: One of the motors at Maxwell's quarry

of his services. Saturday's function was the eleventh held at Raynes Park, and once again was favoured with fine weather. Last year's record attendance must have been at least equalled, and everyone enjoyed a full day, which included sports, concerts, dancing and other amusements. The exhibition itself, in spite of the abnormally dry season, was well up to standard, and the respective winners of the A. R. Bacon Cup, the Lady Renwick Memorial Challenge Cup, the Sir Bernard Greenwell Challenge Cup and the H. C. Wells Cup were, Mr. Hemsley (West Kent), Mr. W. R. Simpson (City Road), Mr. Stagg (Camberwell) and Mr. Ashby (Barking). The Harry Renwick Memorial Cup was won by the Balham team. These and many other prizes were presented by Mrs. Miles, and afterwards presentations were made to Mr. Bacon of a refrigerator and a cheque by Sir Robert Renwick, Bt., deputy president of the Club, on behalf of the directors, and a cocktail cabinet by Mr. E. A. Hammersley, on behalf of the Club. The Club also presented Mrs. Bacon with a gold watch.

An Unusual Window Display

Modern industrial concerns are paying increasing attention to the welfare of employés, and in view of this it is interesting to find a company whch has devoted a window display to an advertisement which is of a purely "prestige" character and designed to illustrate the importance which it attaches to the training of its personnel. The Metropolitan-Vickers Electrical Co., Ltd., is using one of its large ground floor windows in Aldwych in this way. The central feature of the display is a large photograph of employés leaving the Met.-Vick Works in Manchester. The company's water



A Met.-Vick window display in the Aldwych, W.C.2

tower is shown passing through the "O" of the word "Personnel", which appears in large letters at the top of a photograph. The eye is led by a symbolic figure to a series of captions, the first being "The Backbone of Industry is Personnel." The three principal apprentices' courses—college, school and trade—are emphasised by intermittent lighting, while close to the front of the window some of the advantages of Met.-Vick apprentice training are detailed. Copies of the company's brochure "Education for Industry" are displayed, together with photographs showing work on which apprentices may be engaged, and some of their social activities.

E. K. Cole Acquisition

E. K. Cole, Ltd., have acquired the business of Thermovent (1936), Ltd., manufacturers of electrical convection heaters, together with manufacturing rights, patents and goodwill. In view of the rapid development of the "Thermovent" system, increased manufacturing facilities have become essential and these will be provided at the 300,000 sq. ft. factory of E. K. Cole, Ltd., at Southend-on-Sea. "Thermovent" products are now to be actively developed for industrial, architectural, marine and domestic use. All current "Thermovent" apparatus will be available from E. K. Cole, Ltd., Southend, to whom future inquiries should be addressed. Mr. Burnside of the Thermovent Company will continue to act in an advisory capacity.

Orders Recently Booked

The Metropolitan-Vickers Electrical Co., Ltd., has received an order from the South African Government for twenty-two 1,200-h.p. 66-ton, 3,000-V electric locomotives for service on the Natal Railways. The order is valued at nearly £300,000. The new locomotives are required to meet increased traffic and for the extension of the electrified sections. They will be similar to 120 Metro-Vick locomotives supplied previously.

Lowdon Bros. and Co., Ltd., electrical engineers and contractors, Dundee, have secured three large aerodrome contracts in England. The work includes internal wiring for lighting and power, overhead and underground cable systems, fire-alarm systems, &c. These are the largest contracts the company has received since the end of the war, and will give employment to a large number of men for a year or two.

L.E.P. Prize Displays

The Lancashire Electric Power Co.'s display at the Worsley Agricultural Show was awarded a silver medal, and the company's decorated vehicle in the Skelmersdale Carnival on August 21st also secured a prize. Other agricultural shows in which the company has participated include those held at Rufford, Adlington, Hoghton, and Brindle. It was also represented by a similar display of electrical appliances at a horticultural show at Culcheth on August 28th. Coinciding with the summer activities, the company's travelling showroom has also been on tour for the last three months largely in the neighbourhood of Chorley, the townships visited being Coppull, Euxton, Blackrod, and Wheelton, and thirty cooking and refrigeration demonstrations were held during the course of the tour.

Belgian Foreign Electrical Trade

The following table shows the Belgian imports and exports of electrical machinery, apparatus and cognate material during the first half of the current year as compared with the corresponding six months of 1936, the values having been converted at an exchange rate of 143¾ fr. to the £. It will be seen that both sections of the trade have shown a marked improvement, imports having advanced to the extent of £446,920, or over 46 per cent., and exports by £340,626, about 40 per cent.

	Imports. Jan.–June.		Exports. Jan.–June.	
	1936.	1937.	1936.	1937.
	1,000 fr.		1,000 fr.	
Electrical machinery...	25,702	34,970	9,065	11,961
Dry batteries	1,019	1,218	92	91
Accumulators and parts	635	1,973	1,239	1,868
Magnets, other than electro-magnets	1,149	1,551	7	3
Land and submarine cable	694	611	16,560	32,483
Insulated wires and cable	6,036	10,689	19,394	27,630
Carbons and electrodes	3,738	5,058	16	101
Porcelain insulators	707	1,526	191	38
Electric globes, bulbs and glassware	3,852	5,266	3,939	3,469
Insulating tubes, junction boxes, etc.	1,842	2,192	998	993
Other insulating material	1,407	1,936	309	232
Arc lamps	65	81	2	22
Incandescent lamps	8,382	9,203	5,996	8,627
Electrical measuring instruments ...	9,627	12 217	909	1,142
Telegraph and telephone apparatus	2,347	3,182	43,242	49,328
Radio receiving sets, complete ...	4,919	4,553	2,461	5,099
Ditto, partly assembled	576	904	4,107	10,540
Loudspeakers, microphones, etc. ...	2,187	2,617	2,251	1,714
Radio valves	11,647	14,029	848	1,056
Other radio material...	5,904	7,725	432	579
Other electrical apparatus	66,491	81,581	8,644	12,606
Total fr.	138,926	203,079	120,702	169,582
Total at 143¾ fr. to £ ...	£968,265	£1,415,185	£841,130	£1,181,756

British Oxygen Acquisition

The Times reports that the British Oxygen Co. has acquired a controlling share interest in the Odda Smelteworke A/S, of Norway, which is stated to be the largest manufacturer of carbide imported into Britain.

Sixteen Medals

By winning the silver medal of the Royal Sanitary Institute at the Birmingham Congress this year the Hoover electric cleaner acquired its sixteenth medal in eighteen years.

Trade Announcements

In announcing in our last issue that John Moores & Co. had removed to 31, Quay Street, Manchester, we should have stated that the name of this concern is now Albert Taylor (Manchester), Ltd.

Pifco, Ltd., has removed its London office at 150, Charing Cross Road, W.C.2, to Pifco House, 58, City Road, E.C.1, occupying there the whole building, which is being fitted out with large showrooms. The building comprises four storeys and basement, all of which will be utilised for display, warehouse and offices.

Key Electrical Installations, 14, Elm Park Road, N.21, have opened branch showrooms at 360, High Road, Wood Green, London, N.22 (Tel. Bowes Park 3311).

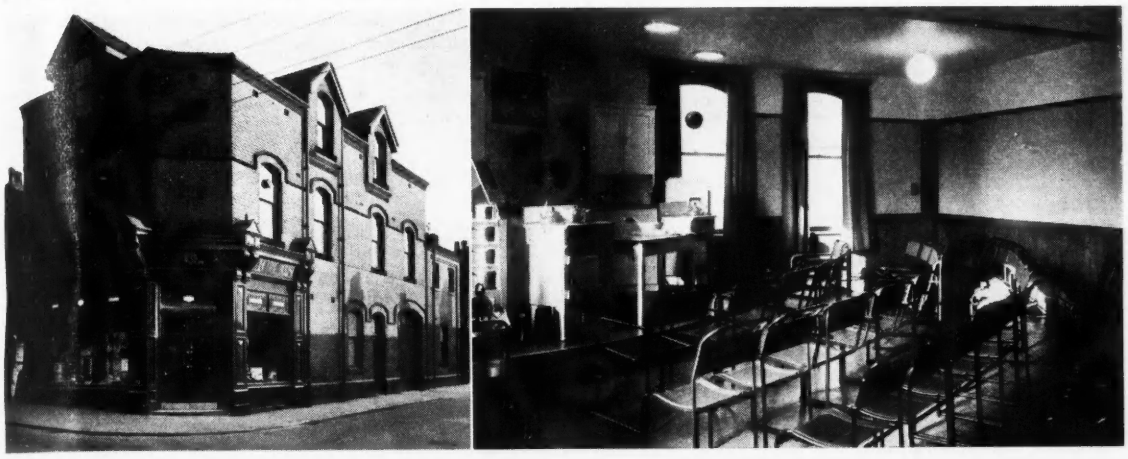
F. W. Lechner & Co., Ltd., have removed to 5, Fairfax Road, London, N.W.6. (Telephone: Maida Vale 5966.)

Holiday & Hemmerdinger, have removed to 74-78, Hardman Street, Deansgate, Manchester.

Electric House, Hyde

That the new Electric House at Clarendon Place, Hyde, might be the forerunner of others in the area of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board was the hope expressed by the Mayor of Hyde (Councillor F. Whalley) at the official opening on August 26th. Those present included members of the Board, Mayors of towns represented on the Board, and representatives of neighbouring supply undertakings. Counc. F. D. Ashton, chairman of the Electricity Committee of the Board, who presided, said that Electric House was the Board's first showroom except for the small one at the works and offices at Tame Valley. Although the Tame Valley showroom was very much "out of the way," sales had been conducted there amounting to £28,000 during the past twelve months. Declaring the new premises open, the Mayor of Hyde said that for some time past it had been felt by the Board that the provision of a showroom in the Hyde area was a necessity. The number of consumers, and appliances sold to consumers, within the Hyde area during

the past year or two had increased substantially. Referring to the successful operation of the Board, he said that 74 per cent. of the residents in Hyde were now consumers of electricity and the total consumption of the town was 22,500,000 kWh per annum, bringing in a revenue of nearly £80,000. Mr. J. Harwood Lumsden, the Board's chief engineer, referred to the facilities at the showrooms, and said there would be cookery demonstrations every Wednesday evening and Thursday afternoon. Other speakers were the Mayor of Mossley (Alderman H. Laming) and Sir Charles H. Booth (chairman of the Board). Occupying a central corner site, Electric House has two large display windows for the exhibition of appliances. On the ground floor there is a large space for display purposes and a counter for the payment of accounts and for inquiries. The first floor is reached by a panelled staircase leading to a wide hall where small electrical appliances are shown on stands and in display cases. On this floor there is a demonstration



The exterior and the demonstration room of the new showrooms at Hyde of the Stalybridge, Hyde, Mossley and Dukinfield Electricity Board

room with accommodation for about fifty persons. The platform is laid out as a kitchen with cupboards, sink, water-heater, cookers and refrigerator. Also on this floor is a well-equipped modern bathroom. There are several small anterooms on this floor for the staff. Mr. Harold Smith is the showroom sales superintendent.

Prices of Materials

Henry Gardner & Co. report, September 1st: Copper bars (best selected), sheet and rod, £91, £2 dec. English pig lead, £23 15s., 10s. dec. Spelter, £23, £1 5s. dec. English block tin, £261 10s., £1 5s. inc.

Frederick Smith & Co. report, September 1st: Electrolytic copper bars, £62 10s., £5 dec. Ditto, ditto, wire rods, £67 10s., £5 dec. Ditto, ditto, h.c. wire, 9⅛d., $\frac{5}{16}$d. dec. Silicium bronze wire, 10$\frac{11}{16}$d., $\frac{5}{16}$d. dec.

Edward Till & Co. report, September 1st: No change in the price of India rubber, Para fine.

The Southend Illuminations

On Wednesday last week Southend's Festival of Light, 1937, was formally inaugurated by the Mayor, Ald. W. Miles. This year's illuminations include a large number of improvements to the schemes of previous years, and in all approximately 110,000 lamps, in addition to numerous electrically operated set-pieces, have been used. There are additional set-pieces on the foreshore, such as Robinson Crusoe's Island, phantom and pirate ships, a volcano, a paddle boat manned by the "crazy folk," and a pillar of light with changing colour, with specially designed mechanism and approximately 750 lamps, to mention but a few of the attractions. One feature of which Mr. A. C. Johnson, the borough electrical engineer, is justly proud is the treatment of the flower gardens below the bandstand. Here cleverly concealed floodlights of various colours combine to produce a beautiful effect. The popular "Never, Never Land" in the shrubbery has been completely redesigned, and the main features this year include the "Humorous School" and fairyland castles, while hundreds of new illuminated flowers have replaced the foxgloves, &c., of last year. Improvements have also been made on the pier. "Neptune's Nursery" has been given new settings, and additional features are a tropical garden solarium, a model of Britannia, and the outlines of a battleship and a yacht. Here again the children have been catered for by a Punch and Judy show, "Ride a-Cock Horse," and "I Saw a Ship Go Sailing." The illuminations, which cover four and a half miles of route, will continue until October 17th. Typical examples of some of the set-pieces are illustrated on page 324.

New Catalogues and Lists

Electro-Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—A catalogue of power equipment for television, radio, public address, &c.

Smith's English Clocks, Ltd., Cricklewood.—A folder dealing with advertising displays for electric clocks.

Dubilier Condenser Co. (1925), Ltd., Victoria Road, North Acton, London, W.3.—A catalogue of radio condensers and resistances.

General Radiological, Ltd., 204, Great Portland Street, London, W.1.—Catalogues illustrating the Röntgen camera, planigraph, "tele-pantoscope" and high intensity X-ray therapy apparatus.

British National Electrics, Ltd., Newarthill, Motherwell.—A catalogue and folder illustrating and describing the new season's fires.

Automatic Coil Winder and Equipment Co., Ltd., Winder House, Douglas Street, London, S.W.1.—A leaflet giving details of the "All-wave Avo-Oscillator" and a complete illustrated catalogue of the company's testing instruments and coil winders.

Bankruptcy Proceedings

E. Weston, trading as Weston Electrical Contracts Co., 41, Upper Marylebone Street, London, electrical and radio dealer.—This debtor attended before Deputy Registrar Mellor at the London Bankruptcy Court, on August 24th, for his public examination. He said his liabilities amounted to £668, while he had no assets. He carried on business in his own name as an electrical engineer from 1918 to 1923, after which he adopted the trading style of Weston Contracts Co., which in January, 1926, was altered to Weston Electrical Contracts Co. In 1930 he started as a radio dealer. He suffered losses by depreciation in the value of radio accessories, bad debts and through customers defaulting under hire-purchase agreements. Eventually his turnover proved insufficient to meet his outgoings and consequently bankruptcy proceedings ensued. The examination was concluded.

D. P. Phillips, Cartref, Talog, Carmarthenshire, formerly radio dealer.—The receiving order herein was made on the debtor's own petition, and the first meeting of creditors was held recently at 4, Queen Street, Carmarthen, when the case, being a summary one, was left in the hands of the Official Receiver, as trustee.

S. Holmes, electrical and wireless engineer, formerly residing and carrying on business at 41, High Street, South Normanton, now residing at 37, Downing Street, South Normanton.—First meeting, September 3rd, at 22, Regent Street, Park Row, Nottingham. Public examination September 21st at the Court House, Derby.

F. H. Pountney (Bordesley Electrical Co.), electrical engineer, 164, High Street, Bordesley, Birmingham.—First and final dividend of 2d. in the £, payable September 6th at Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

A. E. Baker, electrical engineer, 42, Chapel Road, Bexleyheath.—Last day for receiving proofs for dividend, September 8th. Trustee, Mr. F. C. Wells, 280a, High Street, Rochester, Official Receiver.

C. B. Powls (Powls Bros.), electrical contractor and automobile engineer, Main Road, Burton Joyce, Notts.—Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver, released August 18th.

E. Mankellow, electrician, 2, Holly Cottages, Ascot Place, Ascot.—Application for discharge to be heard at the Town Hall, Windsor, on October 26th.

H. W. Fletcher, wireless dealer, 233, Normanton Road, Derby.—Receiving order made August 23rd, on debtor's own petition.

A. H. Estall, electrical contractor, 20, Thackeray Street, Kensington, W.8.—Discharged as from August 28th, 1937.

Company Liquidations

Aerodyne Radio, Ltd., Park View Road, Tottenham, N.17.—The statutory meeting of creditors was held in London on August 30th, when Mr. R. A. Webb, a director, presided. Mr. W. H. Cork, (W. H. Cork & Co., accountants and auditors, 19, Eastcheap, E.C.), said that on August 9th last, he agreed to act as receiver under a debenture, and as a result a statement of affairs was prepared and it was decided to put the company into voluntary liquidation. A statement of affairs was submitted showing liabilities totalling £28,728. There were also stated to be claims under hire purchase agreements of £728, but those were not taken to rank. The net assets were £8,675, leaving a deficiency, as regarded the creditors, of £20,054. Mr. Cork stated that the company was registered in 1930 to deal in wireless, electrical and scientific apparatus and was originally styled Hustler, Simpson & Webb, Ltd.; the name was changed in 1934. The nominal capital was £11,000, of which £7,062 had been issued. The directors of the company were Messrs. Webb and A. Barker. After carrying on business in Bermondsey and Walthamstow, the company re-

moved to the present premises in 1934. Mr. Cork further stated that he had prepared a deficiency account which showed that there was a balance of £15,510, which was presumably the loss on trading from July, 1936. The directors had expressed the view that the company had lost approximately £14,000 in the last twelve months. The debenture, dated June 1st, 1937, was granted to a Mrs. Newland and was in respect of actual cash paid over to the company, which was subsequently paid to creditors. The directors' explanation of the decline in turnover was that from the date of incorporation up to 1935 they had their own system of factors and distributing, but upon joining a trade association they gave this up and their turnover commenced to decline. Mr. Cork stated that the figures on the trading account showed that with a capital of £7,000 they were doing a turnover of nearly £200,000 and he was sure their difficulties had arisen purely from over-trading. The directors had received an offer for the assets of £10,944, subject to certain reservations, which was not accepted. They then proceeded to negotiate for a larger figure. A meeting of the principal creditors and shareholders was held on August 18th, and while that meeting was in progress a further offer was received for the whole of the assets of the company amounting to £12,050. This was accepted and a sum of £10,500 had already been paid over. As a result the creditors would get a small dividend out of the estate, whereas if the matter had been allowed to drift on and the stock and other assets sold forcibly it was doubtful whether they would have realised sufficient to pay the debenture holder and preferential claims in full. The shareholders had previously met and passed the usual resolution for the voluntary liquidation of the company and had nominated Mr. Cork as liquidator. The creditors confirmed the appointment and elected a committee of inspection.

Sam Sharples, Ltd., electrical engineers, Manchester.—A meeting of creditors was held on August 24th at the offices of Mr. J. W. Shepherd, 78, King Street, Manchester. The statement of affairs which was submitted showed liabilities totalling £1,044 all due to unsecured creditors. The net assets were £322, leaving a deficiency, as regarded the creditors, of £722. The issued capital of the company was £502, and the deficiency, so far as the shareholders were concerned, was £1,224. The company was formed in 1929, with a nominal capital of £1,000. The present position had been brought about by lack of capital and consequent inability to take large contracts, heavy expenses on contracts and in travelling in an attempt to obtain contracts. The creditors decided that the voluntary liquidation of the company should be continued with Mr. Shepherd as liquidator, with a committee consisting of the representatives of J. C. White & Co., and the Greengate & Irwell Rubber Co., Ltd.

Radio Utilities, Ltd., 10, Working Street, Cardiff.—The statutory meeting of creditors was held on August 23rd, at the offices of Poppleton & Appleby, 35, Windsor Place, Cardiff. A statement of affairs was submitted showing ranking liabilities of £546, and in addition there was a fully secured creditor for £12. After allowing £23 for preferential claims the net assets were £577, leaving a surplus, so far as the creditors were concerned, of £31. The creditors decided to confirm the voluntary liquidation of the company with Mr. L. S. Findlay, of Poppleton & Appleby, as liquidator, with a committee of inspection. It was stated that efforts would be made to dispose of the business as a going concern.

E. Marshall, Ltd., electrical engineers, 20, High Holborn, W.C.1.—The statutory meeting of creditors was held on August 26th in London, when a statement of affairs was submitted which showed ranking liabilities of £2,746, of which £2,450 was due to fifty-three unsecured creditors and the balance of £297 was in respect of rent. The net assets were £1,733, leaving a deficiency of £1,013. The shareholders had previously met and passed a resolution for the voluntary liquidation of the company and had nominated Mr. W. W. Hodgson, of 35, Copthall Avenue, E.C., to act as liquidator. The creditors decided to confirm the voluntary liquidation of the company with Mr. Hodgson as liquidator. A committee was also appointed.

Northampton Radio & Plating Co., Ltd.—Particulars of claims by September 11th, to the liquidator, Mr. A. W. H. Lenton, 29a, Abington Street, Northampton.

Private Arrangements

J. A. Robertson & Sons, wireless dealers, 304a, New Cross Road, S.E.16.—The creditors met on August 23rd, when the debtors' accountant reported that the liabilities totalled £848, the principal items being trade and sundry creditors, £457; cash claims, £330; and bankers, £51. The total assets were £231, leaving a deficiency of £617. It was decided that a deed of assignment should be executed in favour of Mr. Myles, 189, High Road, Balham, S.W., as trustee.

J. Priestly, trading as Priestly & Ford, at Birmingham, Nottingham and Manchester, radio and electrical wholesaler.—A meeting of creditors was held in London on August 24th, when the chair was occupied by the representative of the Marconiphone Co., Ltd., the largest trade creditors. A statement of affairs as at August 12th, 1937, was submitted by Mr. Colesworthy, accountant, which showed total liabilities of £40,906. The total assets were £37,617, leaving a deficiency of £3,290. Mr. Colesworthy said that there was a goodwill in the business, and that far more was to be gained by carrying it on under, perhaps, some supervision, than under administration in bankruptcy. While the business could be carried on profitably it might be advisable to dispose of it as a going concern, or there might be some method of reconstruction adopted by which fresh capital could be found and the business put on a sound footing. Mr. W. H. Cork, representing creditors, proposed that, subject to the debtor's wife withdrawing her claim, the debtor should execute a deed of assignment for the benefit of creditors, the deed not to be registered for seven days, and that the deed should be taken to Mr. Colesworthy and Mr. Charles Latham, of the Radio and Gramophone Trades Guardian Association. A resolution to this effect was carried, and a committee of inspection was also appointed.

Electricity Supply

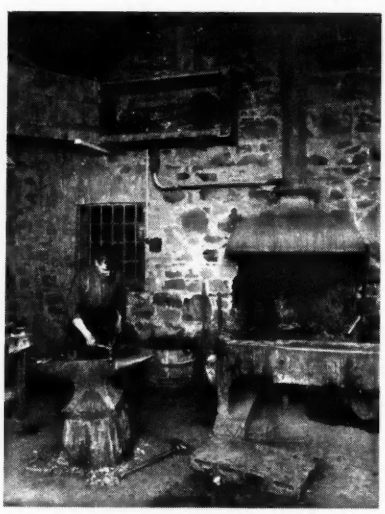
Lighting, Domestic, Power

Aberdeen.—EFFECT OF HIGHER COSTS.—The largest advance in energy sold in one year yet recorded was made during the twelve months ended May 31st, and according to the annual report of Mr. Alex. Gardner, the electrical engineer, a general reduction in charges might have been made but for the increased price of coal and materials. Commenting on coal supplies, Mr. Gardner states that users are practically compelled to take what is offered them, and at a price fixed by the Scottish Area Sales Committee.

Alloa.—STREET LIGHTING.—As an experiment six "Osira" high-pressure mercury electric-discharge lamps are to be installed by the Electricity Department. It is possible that the new type of lamp may be fitted to existing standards throughout the town.

Basingstoke.—OVERHEAD LINES.—Subject to the approval of the Town Planning Committee the Rural District Council has approved a plan for the erection of high- and low-voltage lines to Sherfield-on-Loddon. This is part of a scheme of the Corporation for supplying electricity to the northern parts of the district.

Belgium.—CO-ORDINATION.—When the Union des Centrales Electriques Liège-Namur-Luxemburg (Linalux) was formed it comprised six electricity undertakings with a plant capacity of 73,000 kW; today it embraces fifty-one undertakings, including iron, steel, zinc and chemical products works, collieries, tramways and railways and distribution companies, and the plant capacity amounts to 382,300 kW. It is stated that whereas the power exchanges between systems in 1923 amounted to 32 million kWh, a total of nearly 173½ million kWh was reached in 1935. As regards the economic aspect of the Union's operation, it is shown that for the required output it has been possible by parallel working to effect a saving of 27.9 per cent. in generating plant, and by regulating the load on the different stations a further saving of 13.5 per cent. has been obtained in the machinery in operation at any one time. The cost of fuel has also been reduced to the extent of 35.5 per cent. by the use of blast-furnace gases and lower grades of coal.



The smithy may still stand under a spreading chestnut tree, but the modern blacksmith stands beneath an electrically driven blower with push-button control. The motor is a Crompton Parkinson machine

Birmingham.—MAINS AND EQUIPMENT.—It is anticipated that a capital expenditure of £350,000 will cover the requirements of the Electric Supply Committee for general mains extensions until September 30th, 1938.

Bristol.—ALL-ELECTRIC HOUSES.—The Filton Estates, Ltd., propose to build two thousand all-electric houses near the Bristol Aeroplane Works, to house aeroplane workers. Prices will range from £495 to £555, and the most modern electrical domestic equipment will be installed in each.

Burnley.—SUPPLY AREA EXTENSIONS.—The Order of the Electricity Commissioners extending the Corporation's supply area to Ightenhill, Habergham Eaves and Worsthorne-with-Hurstwood, with the deletion of any preferential charge, has been accepted by the Electricity Committee. Although there is provision for a preferential tariff at Cliviger, this will be dispensed with, as the Committee feels it would be inequitable to make any differentiation.

Fleetwood.—HIGH PERCENTAGE OF CONNECTIONS.—In the annual report of the Electricity Department it is stated that 92 per cent. of the premises in the town capable of receiving a supply of electricity have been connected to the mains. There are 1,960 electric cookers and 1,800 immersion heaters installed in houses.

France.—EXTENSIVE HOSPITAL INSTALLATION.—The new hospital at Eaubonne, in the Seine-et-Oise department, is designed to accommodate 300 persons and comprises sixteen buildings. The decision to adopt electric heating, cooking and water heating was largely due to a reduced tariff for supplies arranged with the Société Nord-Lumière. According to the *Revue d'Electricité et de Mécanique*, the volume of the rooms to be

heated amounts to about 1,624,500 cu. ft., while the apparatus installed aggregates 3,850 kW, of which 3,400 kW is for room heating, 300 kW for cooking, and 150 kW for water heating.

ELECTRICITY PRODUCTION INCREASES.—According to figures published by the Ministry of Public Works the quantity of electricity produced by steam plants during the first six months of this year was 1,672 million kWh, against 1,705 million kWh during the corresponding period of last year, but this decrease was more than balanced by the increase in hydro-electric production from 3,957 to 4,394 million kWh, the total production by steam and hydro-electric plants being 6,067 million kWh, against 5,663 million kWh in the first half of 1936.

Gainsborough.—DISTRIBUTION.—Considerable work has been carried out during the past year in connection with general mains and distribution states Mr. H. Breckell, electrical engineer and manager, in his annual report. There is, however, still much to be done as the capacity of many of the cables laid a few years ago needs supplementing.

Germany.—DOMESTIC ELECTRICAL DEVELOPMENT.—While in 1932 there were only about 2,000 electric cookers in Berlin, the number in July of this year has been estimated by the Berlin Power and Light Company at 40,000. Water heaters have, over the same period, shown a somewhat smaller increase in number, from about 2,500 in 1932 to an estimated 12,000 last month.

LARGE ELECTRICITY SCHEME.—The Rhenish-Westphalian Coal Syndicate has recently decided to establish a company with a capital of up to 40,000,000m. (about £3,200,000) to co-operate with the Vereinigten Electrizitätswerken A.G. of Dortmund (V.E.W.) in increasing the supply of electricity for light and power in Western Germany, states *The Times* Berlin correspondent. The enterprise is required to meet not only the expected normal increase in the demand for supplies within the next few years, but the special needs of the four-year plan under which large works are being established for the production of synthetic raw and industrial materials. For certain of these materials electrolytic and electrothermic processes are of first importance. The new company to be set up by the Ruhr coal interests will erect power stations to use hard coal and supply electricity to the V.E.W. for distribution in the Rhine-Westphalia district, particularly to raw material works. First, however, the V.E.W. will increase its own output.

Glasgow.—POWER STATION EXTENSIONS.—October 1st has been tentatively fixed as the date for the official starting up of the first instalment of the new plant being erected at the Dalmarnock power station. About £900,000 is being spent on new plant.

Guisborough.—LOAN.—The Urban District Council is to apply to the Electricity Commissioners for sanction to borrow £3,030.

Harwich.—LOANS.—Application is being made by the Town Council for sanction for loans of £1,500 for meters and £6,500 for other apparatus required for the purposes of the undertaking.

Work in progress on the site of the Gants Hill underground railway station at North Ilford. The new station will be on the extension of the Central line from Liverpool Street station.

Kent.—SUPPLY TO SANATORIUM.—The County Health Committee has arranged to take a mains supply of electricity for the Lenham Sanatorium, and £1,243 is to be spent on rewiring and apparatus.

Manchester.—STREET LIGHTING.—During 1936-37 the number of electric street lamps was increased by 699, 119 of these replacing gas lamps. The total number of lamps in use at the end of the period was 30,427 (21,014 gas and 9,413 electric) lighting 783 miles of roads and passages.

The Grid in Central England

Joint Authority's grievance

IN its report for 1936-37 the West Midlands Joint Electricity Authority complains that energy repurchased from the grid is costing it much more than if it were operating independently.

It is recalled that the original scheme of the Authority, as formulated by the previous owners of the generating stations in co-operation, and approved by the Electricity Commissioners, offered the maximum economy and efficiency in generation for the West Midlands district, which was specially delimited by the Commissioners as being the most suitable for regional development. The Authority was established in 1925 to carry out this scheme, but while it was only in the preliminary stages of organisation, the 1926 Act setting up the Central Electricity Board was passed, and under that Act the Central England Electricity Scheme, 1928, was subsequently published, whereby the Authority's stations were selected for operation under the control of the Central Board as regards quantity, time and rate of output. The estimates published with the Scheme showed that by selling its output to the Board at the cost of production as defined in the Act, and repurchasing the energy required for its district at the tariff applicable to owners of selected stations, *viz.*, adjusted station cost plus a proportion of the Board's expenses, the Authority would, from the very first period of trading, make substantial and progressive savings compared with what it could do by development on individual lines under its own scheme.

The Act and the Scheme thereunder are, however, working out in an entirely different manner from that forecast in the official estimates. So far from resulting in savings to the Authority, for the first complete year of trading the Board's statutory charges for supplies were about £186,000 more than the Authority contends would have been the cost of generation under individual operation. The excess was mainly accounted for by the fact that under the Act the Authority is only entitled to repurchase on the cost basis the actual quantity of electricity generated at its stations, whereas the method of output control operated by the Board for the purposes of the Central England Area as a whole necessitates a great number of short-time importations of current by the Authority, which are charged for at the general grid tariff, and are consequently relatively costly.

So long as the output is directed in such a way as to cause frequent importations, the hypothetical cost of production under the original scheme of the Authority will be the only practicable basis for calculating the price to be paid to the Board year by year for supplies, and the right under Section 13 of the Act, to obtain supplies at this cost is the only safeguard against the dissipation of the advantages of the co-ordinated generating resources of the West Midlands, in respect of which the Authority is in the position of trustee for the distributing undertakings. In facing this situation, moreover, apart from any question of disappointment that the estimated savings under the Act show no signs of materialising, the Authority says that it cannot but be perturbed at the amount of unproductive effort which goes on continuously, absorbing the time of the executives, in working out the technical and financial complexities of a largely imaginary undertaking for the purpose of prolonged negotiations as to the hypothetical cost of production, with the growing uncertainty as time goes on as to what the actual facts would have been if the Act had not been passed, and the impossibility of even a reasonably accurate estimate of the cost of the bulk supplies on which to base its own charges, which must perforce be fixed in advance.

These remarks, it is emphasised, do not reflect in the slightest degree on the admittedly able administration of the Central Board, and the Authority expresses the hope that the extensions at present being carried out at Ironbridge will enable the Board to control the loading of the stations in such a way as not only to bring the Authority within the scope of the tariff designed for selected stations, but also to afford it some measure of benefit in return for the heavy capital outlay which it is incurring for the purposes of the national scheme.

MAINS.—The Electricity Committee has obtained sanction to borrow £250,000 for mains.

LIFTS.—New service lifts are to be installed at the Victoria Hotel by the Buildings Committee at a cost of £1,050.

Morecambe.—ILLUMINATIONS.—This year the illuminations have been extended to Happy Mount Park. The official switching-on was performed by the Yorkshire film comedian, Mr. Sydney Howard, last week.

Pontypridd.—NEW GENERATING PLANT.—Extra plant costing £400,000 is to be installed at the South Wales Power Company's station at Upper Boat, near Pontypridd, Glam. The development of the Treforest Trading Estate is a contributory reason for the new equipment and an agreement has been made with the South Wales and Monmouthshire Trading Estates, Ltd., under which considerable quantities of electricity and steam will be supplied to them from the Upper Boat station for distribution to the trading estate tenants. It is expected that the bulk supply of electricity will be followed very shortly by a bulk supply of steam. Orders placed in connection with the expansion of the generating and boiler plant include a contract for a 30,000 kW turbo-alternator set, complete with air cooler, condensing plant, de-aerating plant, and a full complement of auxiliaries. An order has also been placed for two boilers to provide the steam necessary for this turbo-alternator set. These extensions are scheduled to be in operation at the end of 1938.

Ruthin.—REDUCED ELECTRICITY CHARGES.—We are informed by Mr. V. C. Botham, borough electrical engineer, that the charges for electricity are to be reduced as from October 1st next. The present lighting rate of 8d. will be lowered to 5½d. per kWh, while the power charge will be 2d. instead of 3d. per kWh. The two-part tariff fixed charge is being reduced by one-sixth and the running charge from 1½d. to 1d. per kWh. The heating and cooking flat rate is to be 1d. instead of 3d. per kWh.

South Shields.—ILLUMINATIONS.—The annual illuminations organised by the Town Council will commence on September 4th. They are being held in the Marine Park and will continue for a fortnight.

Todmorden.—REDUCTION IN CHARGES.—Councillor J. Jackson, chairman of the Electricity Committee, has announced reductions in charges for lighting purposes amounting to about £800 a year. The flat rate is to be reduced from 5¾d. to 5d. per kWh.

Wolverhampton.—LIGHTNING STRIKES GRID SYSTEM.—A 132-kV overhead line of the Central Electricity Board's grid system between Wolverhampton and the Ironbridge generating station was struck by lightning on Monday evening. The fractured line fell across the main Great Western railway track at Stowheath, and traffic was held up for an hour and a half. The electricity supply was maintained by other lines.

Traction

Aberdeen.—TRAMWAY EXTENSION.—The extension of the Woodside tramway to the city boundary at Scatterburn, at a cost of £12,815 has been recommended by the Transport Committee.

London.—NEW TROLLEY-BUS ROUTES.—On September 12th the London Passenger Transport Board is to convert a further five tram routes to trolley-bus operation. Those affected are as follows: 612, Mitcham (Fair Green) to Battersea (Princes Head); 626, Acton (Market Place) to Clapham Junction; 628, Craven Park to Clapham Junction; 630, Harrow Road (Scrubs Lane) to West Croydon; and 689, Stratford (circular route). In addition, route 655 is to be extended from Hammersmith to Clapham Junction and route 685 from Leyton (Markhouse Road) to Canning Town. By the end of the year there will be 170 miles of trolley-bus route and 720 vehicles in service.

Manchester.—TROLLEY-BUSES.—Sanction has been received by the Transport Committee to borrow £5,000 for the conversion of Ashton New Road tramway route to trolley vehicle working, and to a loan of £77,100 for the purchase of trolley-buses.

Newcastle-on-Tyne.—ELECTRIC RAILWAY.—The new electric train service between Newcastle and South Shields, which will replace the present steam service, will come into operation early next year. The distance is about nine miles and the new service will reduce the travelling time.

TROLLEY-BUSES.—Trials have been held with the new trolley-buses soon to be put into operation by the City Council on the Stanhope Street to Walker route. At present the route is served by tramcars and the erection of the necessary overhead lines for the trolley-buses has been carried out at night.

Sweden.—TROLLEY-BUSES.—The administration of the municipal tramways in Göteborg has applied to the Council for a grant of 500,000 kr. for a trolley-bus system on the Lilla Torget-Grabersgatan route. This will be the first system of its kind in Sweden.

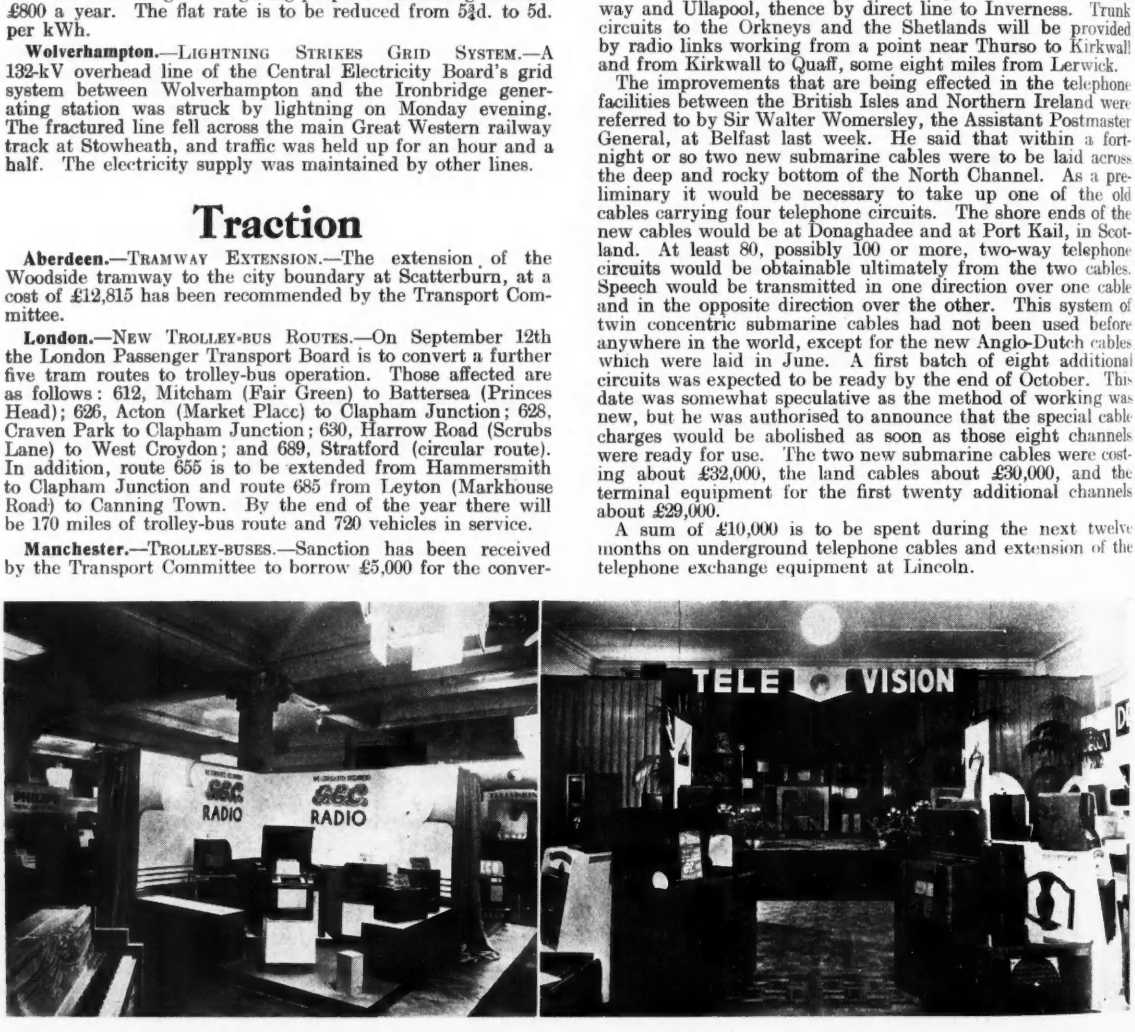
Communications

Belgium.—TELEPHONE PROGRESS.—The Ministry of Posts and Telegraphs has announced a big reduction in telephone charges. Prior to the war there were only about 51,000 subscribers throughout the country, but the number has greatly increased in recent years, having risen to 224,804 at the end of 1935, 245,805 in 1936, and to 260,058 at the end of June last. At the present time new applications are being received at the rate of about 1,500 per month, and it is expected that the rate of progress will be increased when the new scale of charges comes into operation.

Great Britain.—TELEPHONE DEVELOPMENT.—During a visit to Scotland last week Major G. C. Tryon, the Postmaster-General, stated that nearly £1,000,000 is being spent during the present year alone on the provision of new long-distance underground cables. The long-distance telephone network is based on three principal zone centres at Glasgow, Edinburgh, and Aberdeen. The circuit capacity is being greatly increased by the provision of twelve-channel carrier cables. Work will shortly begin at Oban, Tobermory and Castlebay on stations for the new ultra-short-wave radio-telephone service to Barra and Uist. Lewis and Harris will be served by radio-telephone between Stornoway and Ullapool, thence by direct line to Inverness. Trunk circuits to the Orkneys and the Shetlands will be provided by radio links working from a point near Thurso to Kirkwall and from Kirkwall to Quaff, some eight miles from Lerwick.

The improvements that are being effected in the telephone facilities between the British Isles and Northern Ireland were referred to by Sir Walter Womersley, the Assistant Postmaster General, at Belfast last week. He said that within a fortnight or so two new submarine cables were to be laid across the deep and rocky bottom of the North Channel. As a preliminary it would be necessary to take up one of the old cables carrying four telephone circuits. The shore ends of the new cables would be at Donaghadee and at Port Kail, in Scotland. At least 80, possibly 100 or more, two-way telephone circuits would be obtainable ultimately from the two cables. Speech would be transmitted in one direction over one cable and in the opposite direction over the other. This system of twin concentric submarine cables had not been used before anywhere in the world, except for the new Anglo-Dutch cables which were laid in June. A first batch of eight additional circuits was expected to be ready by the end of October. This date was somewhat speculative as the method of working was new, but he was authorised to announce that the special cable charges would be abolished as soon as those eight channels were ready for use. The two new submarine cables were costing about £32,000, the land cables about £30,000, and the terminal equipment for the first twenty additional channels about £29,000.

A sum of £10,000 is to be spent during the next twelve months on underground telephone cables and extension of the telephone exchange equipment at Lincoln.



Two radio and television exhibitions which have been arranged by large London stores during the progress of Radiolympia, showing (left) Selfridge's, and (right) Wallis's, High Holborn

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Ayr.—County Council. Electrical work at Stevenston Higher Grade school annexe. County architect.

Birmingham.—September 15th. Electric Supply Department. All-insulated switch-fuses for one year. (August 20th).

Birtley (Co. DURHAM).—Parish Council. Public lighting and overhead lines. (August 27th.)

Blackpool.—September 21st. Borough Council. Two sets of three oil-immersed, single-phase reactors. (August 20th.)

September 9th. Transformers, switchgear and switchboard. (August 27th.)

Bristol.—September 14th. Corporation. E.h.v. and l.v. switchgear and l.v. feeder voltage regulators. (See this issue.)

Cannock.—September 20th. U.D.C. Electrical wiring at the Littleworth Senior Boys' and Girls' school. W. C. Speedy, clerk to the Council.

Cardiff.—September 13th. R.D.C. Electricity Department. Lamps. (August 27th.)

Devon.—September 15th. Standing Joint Committee. Three years' supply of electric lamps, &c. A. J. Withycombe, clerk to the Committee, The Castle, Exeter.

Dewsbury.—September 6th. Borough Council. Electrical stores. (August 27th.)

Dundee.—September 15th. Corporation. Cable. (See this issue.)

East Sussex.—September 16th. County Council. Six months' supply of electric lamps. Public assistance officer, West Street, Lewes.

Edinburgh.—September 6th. Corporation. Electrical, heating and ventilating works at the Public Library, Dundee Street. City architect.

September 8th. Commissioners of H.M. Works. Electric lighting at the Criminal Lunatic Asylum, Carstairs. Engineer, H.M. Office of Works, 122, George Street (deposit £1 1s.).

Erith.—September 10th. U.D.C. Electricity Department. Rewiring of cooker and electric lighting installations and wiring for plug points at the Sanatorium, Belvedere. (See this issue.)

Essex.—September 30th. County Council Education Committee. Equipment for the South-West Essex Technical College, Walthamstow. (August 27th.)

Farnworth.—September 10th. U.D.C. Electricity Department. L.v. paper cables. (August 27th.)

Finchley.—September 27th. Borough Council. Twelve months' supply of immersion heaters and circulators and aluminium utensils for use on electric cookers. (August 27th.)

Gloucester.—Electricity Committee. Twelve months' supply of electric cookers and water heaters. (August 27th.)

Godstone.—September 7th. R.D.C. Pumping plant, consisting of electric motors, pumps, stand-by oil-engines, suction and delivery pipes, &c., for the sewage disposal works. Engineer and surveyor, Council Offices, Oxted.

Hendon.—September 17th. Corporation. Electrical installation at the Edgware Junior and Infants' school, High Road, Edgware. (See this issue.)

India.—September 8th. Bombay, Baroda and Central India Railway Co. 350 b.h.p. vertical four-cycle heavy oil engine. (August 20th.)

NEW DELHI.—January 11th. Stores Department. Electric table fans with flexible cords. (T. 18441/37.)*

December 7th. A.c. ceiling fans and regulators. (T.Y. 18439/37.)*

December 14th. D.c. ceiling fans and regulators. (T.Y. 18440/37.)*

MADRAS.—September 20th. Electricity Department. Distribution mains, sub-stations and street lighting equipment. (T. 18708/37.)*

Iran.—Ministry of Posts, Telegraphs and Telephones. Line materials, wet cells, dry batteries and accessories. (See this issue.)

Littleborough.—September 13th. U.D.C. E.h.v. feeder cables. (August 27th.)

London.—KENSINGTON.—September 13th. Borough Council. Vehicle-actuated automatic traffic control signals at several road junctions. Borough surveyor, Town Hall, W.8.

Manchester.—September 13th. Markets Committee. Automatic electric passenger and goods lift. City architect, Town Hall (deposit £1 1s.).

September 10th. Electricity Committee. Ventilating plant for transformer chambers, at the St. Ann's Square sub-station. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall (deposit £1 1s.).

New Zealand.—WELLINGTON.—October 14th. Post and Telegraph Department. P.i. telephone cable. (T. 18926/37)*

October 26th. Public Works Department, 11,000-V., p.i., l.c. circular conductors and outdoor type cable boxes. (T. 18932/37.)*

December 7th. Public Works Supplies and Tenders Committee. Two exciters, 420-V switchgear and control board. (T. 18922/37.)* Switchgear and reactors. (T. 18920/37.)*

Oldham.—September 6th. Borough Council. Lighting installation at forty-two bungalows. J. Ashurst, borough engineer, Municipal Buildings, 75, Union Street (deposit £1 1s.).

Plymouth.—September 8th. Corporation. Distribution boards and underground network disconnecting boxes. (August 20th.)

September 13th. Cold chamber at the Mortuary, Vauxhall Street. (See this issue.)

St. Helens.—September 4th. Corporation. Twelve double-deck top-covered four-wheel type trolley-buses complete. A. A. Jackson, general manager and engineer, Transport Offices, Hall Street.

Sheffield.—September 10th. Electricity Committee. Two 3-phase banks of 33,000-V oil-immersed reactors. (August 20th.)

Skelton and Brotton.—September 14th. U.D.C. Electricity Department. Transformers. (August 27th.)

South Africa.—JOHANNESBURG.—September 18th. City Council. Welding plant. (T. 18766/37.)*

October 7th. Union Tender and Supplies Board. Motor generator set. (T.Y. 18770/37.)*

CAPE TOWN.—September 8th. Electricity Supply Commission. Two 10-kVA, three 5-kVA, and three 3-kVA transformers, with fittings. (T.Y. 18471/37.)*

October 20th. City Council. 4,000 metal-clad combined switch and fuse boards for use in connection with domestic supplies. (T.Y. 18941/37).*

PRETORIA.—September 17th. Public Works Department. Two 250-kVA transformers, cable and four l.v. switches. (T.Y. 18455/37.)* Switchboard wire. (T. 18242/37.)* Tubular electric heaters and thermostats. (T.Y. 18456/37.)*

PORT ELIZABETH.—September 9th. Municipality. Transformer. (T.Y. 18438/37.)*

DURBAN.—October 8th. Electrical Department. 6,600-V switchgear. (T. 19051/37.)*

Staffordshire.—September 23rd. Potteries Water Board. Two vertical well pumps and one horizontal surface pump (2 million gal. per 24 hr. each), with electrical controls, cables, pipework and valves. P. Wilkinson, Staffordshire Potteries Water Board, Albion Street, Hanley, Stoke-on-Trent (deposit £5).

Stockport.—September 23rd. Corporation. Three 150,000 lb. per hr. boilers with coal bunkers and ash sluicing plant, and one 30,000-kW turbo-alternator with condenser and auxiliary plant. (August 20th.)

Stoke-on-Trent.—September 8th. Electrical Engineer's Department. Electric cookers, wash-boilers, kettles and storage water-heaters and circulators. (August 27th.)

Sutherland.—September 25th. County Council. Electric lighting at Helmsdale housing estate. E. W. Brannen, architect, Dornoch.

Swansea.—October 4th. Borough Council. Four l.v. sub-station feeder panels. (See this issue.)

Uruguay.—MONTEVIDEO.—October 13th. State Electricity Supply and Telephones Administration. Three automatic voltage regulators for Diesel engine alternator-transformer sets. (T.Y. 18726/37.)*

Wakefield.—September 17th. City Council. Electrical installations at the swimming baths, Sun Lane. (See this issue.)

Walsall and West Bromwich.—September 17th. Walsall and West Bromwich (Barr Colony) Joint Board. Six months' supply of engineers' and electrical fittings. Clerk, Great Barr Park Colony.

West Riding.—September 13th. Public Assistance Committee. Wiring for electric lighting and bells at the Todmorden Institution, and installation of automatic refrigerating plant at the Giggleswick Institution. P. O. Platts, West Riding architect, County Hall, Wakefield.

Wolverhampton.—September 15th. Transport Committee. Electrical installation in connection with a new bus garage in Park Lane. Particulars from H. B. Robinson, borough engineer, Town Hall (deposit £2 2s.), by September 4th.

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Australia.—BLAND (N.S.W.).—Shire Council. Accepted. Copper cable, alternator, exciter and transformers.—B.I. Cables.

MACKAY (QUEENSLAND).—City Council. Accepted. Turbo-alternators (£14,815).—Siemens (Aust.) Pty., Ltd.

ARARAT (VICTORIA).—Town Council. Accepted. Transformers and ammeters.—Siemens (Aust.) Pty., Ltd. Circuit-breakers and transformers.—British General Electric Co.

BRISBANE (QUEENSLAND).—City Council. Accepted. Cable for l.v. switchgear.—Johnson & Phillips. Street lamps.—Siemens (Aust.) Pty., Ltd. Balanced draught equipment for New Farm power house (£1,829).—Babcock & Wilcox, Ltd.—*Tenders.*

Darlington.—Town Council. Accepted. Turbo-alternator for the power station extensions.—G.E.C.

India.—BOMBAY.—Municipal Council. Accepted. X-ray apparatus (Rs.14,999).—Siemens (India), Ltd.

Maltby.—U.D.C. Accepted Wiring 120 houses on the Manor estate (£747).—H. H. Bowyer.

Manchester.—Electricity Committee. Accepted. 400-V overhead line equipment at Baguley.—Johnson & Phillips. Street lighting columns..—Bromford Tube Co.; Newport & South Wales Tube Co.

Education Committee. Accepted. Electrical installation at open air school.—Broughton & Irlam Elecl. Engg. Co.

Newcastle-on-Tyne.—City Council. Accepted. Electric lighting installation at the Todd's Nook Council school (£208).—Falconar Cross & Co.

Rochdale.—Town Council. Accepted. Electrical power installations in houses on the Spotland, Kilworth Street and Turf Hill estates.—Rochdale Electric Co.

Sheffield.—Education Committee. Accepted. Electrical installation at schools: Beck Road (£407), Broomhill (£172), Handsworth (£175), and Lydgate (£245).—Ratcliffe (Electric),

Ltd.; Meersbrook (£233).—W. Malthouse; Morley Street (£451).—T. W. Sampson.

Shropshire.—Education Committee. Accepted. Electrical installation for lighting, power, and auxiliary services at the Shrewsbury Technical College (£4,602).—Rashleigh Phipps & Co.

Stockport.—Health Committee. Accepted. Electrical work in connection with the new maternity wards at the Stepping Hill Hospital (£3,358).—A. E. Sudlow & Co.

Forthcoming Events

Junior Institution of Engineers.—Saturday, September 4th. Visit to the Barking power station of the County of London Electric Supply Co. Saturday, September 18th. Visit to the Engineering and Marine Exhibition, Olympia. Wednesday, September 22nd. Visit to the new headquarters of the London Fire Brigade, Albert Embankment. Saturday, September 25th. Visit to the Mogden purification works, West Middlesex drainage, Isleworth.

Association of Public Lighting Engineers.—Monday, September 6th, to Thursday, September 9th. Folkestone. Annual conference.

Institute of Metals.—Monday, September 6th, to Thursday, September 9th. Sheffield. Annual autumn meeting.

Association of Supervising Electrical Engineers.—Wednesday, September 8th. 6.45 p.m. Visit to the new London University buildings. Saturday, September 18th. Visit to the Engineering and Marine Exhibition, Olympia.

Institute of Marine Engineers.—Tuesday, September 14th. 85, The Minories, London, E.C.3. 6 p.m. Presidential address.

Engineering and Marine Exhibition.—Thursday, September 16th, to Saturday, October 2nd. Olympia, London.

Association of Special Libraries and Information Bureaux.—Friday, September 24th, to Monday, September 27th. Cambridge. Annual conference.

Notes

The "Civils" Secretaryship

The Institution of Civil Engineers is advertising for a successor to the late Dr. Jeffcott as secretary of the Institution. It is required that applicants for the position shall be over thirty-five years of age and that applications shall be submitted not later than November 1st. The duties include the superintending of publication of the Institution's proceedings, control of the library and the conducting of the ordinary business of the Institution. A salary of not less than £1,500 per annum is offered with the benefit of the Institution's staff pension scheme.

The Junior Institution of Engineers

The winter session of the Junior Institution of Engineers will open on Friday, October 1st, when a social re-union together with informal discussions on subjects of interest to engineers will be held at 39, Victoria Street, S.W.1, commencing at 7.30 p.m. Subsequent meetings will be held every Friday throughout the session and among the papers and lectures to be presented are "Submarine Telegraph Cables," by Mr. H. G. S. Trowbridge, on October 29th, and "Recent Technical Developments in the Art of Recording Sound for Motion Pictures," by Mr. W. Harris, on November 19th. The inaugural meeting will be held at the Royal Society of Arts on December 10th, when the President will give his address, and a discussion on "Power Station Efficiencies," to be opened by Mr. R. H. Parsons, is fixed for January 21st.

E.A.W. Summer School

The summer school of electrical housecraft organised by the Electrical Association for Women was opened in the Glasgow and West of Scotland College of Domestic Science on August 26th. Nearly a hundred teachers attended. Miss Caroline Haslett, C.B.E., director of the Association, said that evidence of the growing interest in domestic science was received by the Association recently, when it was requested by a group of London headmasters to give instruction to boys in electrical housecraft. Proceeding, she said that the introduction of electricity had eliminated women's hard work. In one respect, America was ahead of Britain. Kitchen planning was studied on a scientific basis with a view to minimising labour and fatigue, and she was glad to think that Britain was now giving attention to the matter. The job in the home which had been left unsolved by the engineers was one of the most difficult and trying for women—the washing up. A firm of British manufacturers had now produced a dish-washing machine for the home. If the rate of progress continued domestic electrical appliances would become as nearly perfect as the modern motor car. Thermostatic control, incorporated in the latest machines, did the "thinking" for their owners, because they could be so regulated as to perform the job that was wanted. While advances had been made in the electrical industry, much remained to be done on the distribution side, and they were hoping that Government action would help to solve that problem. As consumers they were anxious to have a uniform electricity supply throughout the country at the best possible terms. At present there were too many "uneven patches," and the solution to that lay in new legislation.

Reading a paper on the generation and distribution of electricity, Mr. G. H. Rowbottom, of the Clyde Valley Electrical Power Co., traced development from the pioneering days and, with the aid of lantern slides, illustrated a modern generating plant. Electric circuits, measurements and household installations were discussed by Miss M. Parker, Glasgow, while Miss D. Vaughan spoke on the choice of apparatus.

On Monday afternoon a visit was paid to the Carron Company's works. Various stages of the construction of electric cookers were seen, and the visitors admired the new "Carronade" model. In the electric fire department they were impressed by the variety of designs and finishes, which include the new "Carrosheen" enamel. Tea was provided in Carron Old School.

National Smoke Abatement Society

The ninth annual conference of the National Smoke Abatement Society will be held at Leeds on September 30th, October 1st and 2nd.

The annual general meeting is arranged for Friday, October 1st, to commence at 9.30 a.m., when Mr. H. G. Des Voeux, the President, will give his address. This will be followed by the first session when Messrs. J. E. Acfield and C. Gandy will read papers dealing with "Town Planning and Smoke Abatement," while in the afternoon papers will be presented by members of the Regional Committees. The next day at 10 a.m. a report on "Education and Smoke Abatement" will be given by Mr. Marsh, secretary, on behalf of the Executive Committee. Meetings will be held in the Philosophical Hall, adjoining the Leeds City Museum. Further information may be obtained from the secretary of the Society, Chandos House, 64, Buckingham Gate, S.W.1.

Electrical Housecraft

A course of lectures on "Electrical Housecraft" will be given by Mr. E. W. Jackson on Thursday evenings, commencing on September 9th at the headquarters of the Electrical Association for Women, 20, Regent Street, S.W.1. Particulars and enrolment forms can be obtained from Mr. Jackson, 13, Vicarage Way, Harrow Garden Village, Middlesex.

A Belgian Centenary

In November the College of Mines (Technical Faculty), Liége University, is to celebrate the centenary of its foundation. Actually the College was founded in 1836, but the celebrations were postponed for a year in order that they might coincide with the opening of the new Val Benoît Institutes.

1938 Tramways and Transport Congress

The Tramways, Light Railways and Transport Association has decided to hold its 1938 Congress at Folkestone from June 22nd to 25th.

The I.M.E.A.'s Move

As from September 22nd the address of the Incorporated Municipal Electrical Association will be:—Faraday House, 8-10, Charing Cross Road, London, W.C.2. The telegraphic address will be "Munielect, Lesquare, London"; the telephone number (Temple Bar 1882) will remain unaltered.

An All-electric Organ

Mr. McKechnie Jarvis, the author of the article bearing this title in our issue of August 13th, points out that the actual loading of the motor drive of the Cahill organ mentioned on page 210 was 100 h.p., not 10 h.p. as printed.

Educational

The 1937-38 evening session at the Polytechnic, Regent Street, W., commences on September 20th. Enrolment from September 13th.

Enrolment for evening classes at the Northampton Polytechnic, London, E.C., commences on September 13th. (See our classified advertisements.)

Appointments Vacant

Mechanical and electrical engineering assistants in the drawing office at the Air Ministry and at R.A.F. aerodromes.

Electrical artificers for the Royal Navy.

Mechanical test engineer.

Assistant h.v. distribution engineer for the Liverpool Electric Supply Department.

Temporary assistants II and temporary technical officers in the Admiralty Technical Pool.

Assistant engineer for the Department of Posts and Telegraphs, I.F.S.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

"MANDISCOID-2" leatheroid.

A.P. LTD. (in triangle) bakelite lampholders.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. R. C. Rouse, M.I.Mech.E., A.M.I.E.E., who has been the technical manager of Venner Time Switches, Ltd., for a number of years, has recently been appointed to take over the duties of general manager. He obtained his technical training at the William Ellis School, and at Finsbury Technical College under Dr. Silvanus Thompson, Professor Dalby, and Dr. Meldola.

Mr. Rouse joined the Venner company in 1910. For several years past he has been hon. secretary of the Finsbury Technical College Old Students' Association, and at the last annual dinner a silver presentation was made to him as a recognition of his work. He is a member of the Chemical Club, the Clockmakers' Company, and a Fellow of the Physical Society.

Mr. C. G. Abbey, of Bepco Canada, Ltd., the Canadian subsidiary company of Bruce Peebles & Co., Ltd., Crompton Parkinson, Ltd., the Harland Engineering Co., Ltd., and Lancashire Dynamo & Crypto, Ltd., has arrived in England from Montreal to visit his company's works in England and Scotland. His address while in this country is c/o Crompton Parkinson, Ltd., Export Department, Bush House, Aldwych, London, W.C.2.

Mr. D. D. Watson

Mr. D. D. Watson, M.I.E.E., who has been spending a few weeks in England, will be returning to South Africa early in September. Mr. Watson is general manager of African Cables, Ltd., which is manufacturing electric wires and cables in the Union.

The wedding took place on August 28th, at Streatham, of Miss Dorothy Hunt, daughter of Mr. S. Hunt, A.M.I.E.E., and Mr. Theodore Smith, B.Sc., son of Mr. T. S. Smith, of Welling, Kent.

Mr. J. H. G. McNaughton has recently been appointed advertising manager to Thorn Electrical Industries, Ltd. Mr. McNaughton was formerly for nine years with Crompton Parkinson, Ltd.

I.E.E. Scholarships.—The following scholarships have been awarded by the Institution of Electrical Engineers for 1937:—Duddell, annual value £150, tenable for three years: Mr. R. S. Peacock (King's School, Ely). Swan Memorial, annual value £120, tenable for one year: Mr. B. C. Robinson, Ph.D. (Armstrong College, Newcastle-on-Tyne). William Beedie Esson, annual value £120, tenable for two years, renewable in approved cases for a third year: Mr. R. P. Kinsey (Evershed & Vignoles, Ltd.). Silvanus Thompson, annual value £100, plus tuition fees, tenable for two years: Mr. J. R. Catlin (Igranic Co., Ltd.). David Hughes, value £100, tenable for one year: Mr. L. Lieberman (Queen Mary College, London). Salomons, value £100, tenable for one year: Mr. S. G. Bittles (College of Technology, Belfast). War Thanksgiving Education and Research Fund (No. 1): Grant of £50 to Mr. J. E. Parton, B.Sc. (Birmingham University). Paul Scholarship, annual value £50, tenable for two years: Mr. T. H. Fulford (Acton Technical College, London). Thorrowgood Scholarships, annual value £12 10s. each, tenable for two years: Messrs. J. S. Davis (London, Midland & Scottish Railway Co.), and W. P. Hill (London Passenger Transport Board). No award of the Ferranti Scholarship was made this year.

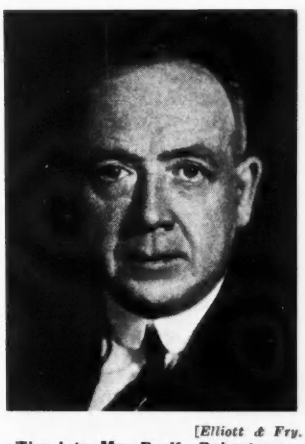
Mr. R. A. Varley

Mr. R. A. Varley, until recently on the sales staff of the Renold & Coventry Chain Co., Ltd., has joined the Vale-Royal Electric Lamp Manufacturing Co., Ltd., of Tottenham, and will represent them in the Midlands and the Potteries. The address of the company's Midland sales office is 3, New Street, Birmingham, 2.

Mr. J. H. Cowell, transport manager, is about to retire from the service of the Blackburn Corporation. His appointment will terminate at the close of the year, and he will be granted a gratuity equal to that which he would receive if the Superannuation Act were in force. Mr. Cowell was appointed manager of the Transport Department in 1906, having previously been joint manager with Mr. L. Johnston.

Obituary

Mr. R. K. Robertson.—The death occurred in an Edinburgh nursing home on August 24th of Mr. Robert Knight Robertson, chief engineer to the Fife Electric Power Co. Mr. Robertson was in the employment of Bruce Peebles and Co., Ltd. Edinburgh, when the company laid down the electrical plant at Townhill, Dunfermline. Later he joined the Fife Electric Power Co., being appointed charge engineer. He was appointed district engineer in the Lochgelly area, and subsequently became technical assistant to the late Mr. Thomson, manager. On the death of Mr. Thomson eight years ago, he was appointed chief engineer.



[*Elliott & Fry.*

The late Mr. R. K. Robertson

Major Robert Grigg, who died on August 11th, 1937, had been on the engineering staff of the Ministry of Transport since April, 1922. He was an associate of the Institution of Electrical Engineers from 1902 and was a regular attendant at the informal meetings.

Will.—Mr. Magnus Volk, managing director of Volk's Electric Railway, left £15,560 (net personalty £7,816).

Italian Electrical Activities

ACCORDING to reports of the main Italian electrical companies, the supply industry seems to have entered upon a new phase of activity since the smaller concerns have been merged with larger companies and small steam plants shut down to ensure the fullest exploitation of national hydro-electric resources. The Società Meridionale di Elettricità of Naples has announced a programme of plant construction in Southern Italy in connection with the electrification of the Italian State Railways, and the Società Adriatica di Elettricità at Venice has started work on a hydro-electric plant on the Isonzo, and another one in Cadore. With regard to steam plants, the Anonima Elettrica Sarda has been authorised to build a new station at Palmas Suergiù, near Santa Catarina. This will make use of the lignites of the Bacu Abis district for fuel.

Within the past few weeks the Italian Government has authorised many schemes for the enlargement of generating plants and the construction of new stations. It remains to be seen how the raising of capital for undertaking the construction of the new plants is to be met. In the course of the past few months several concerns have increased their capital, but most of these are firms under the control of the Istituto Ricostruzione Industriale, *viz.*, of the Italian Government.

There is an extensive programme of railway electrification, including the lines from Trieste to Opicina and Piedicolle, Venice to Pieve di Cadore, Ceva to Ormea (with an extension to Arma di Taggia) and from Battipaglia to Brindisi and Taranto. Not less important in connection with the increase of the demand for electric power in Italy is the development of trolley-bus services. On a new route of 32 km. between Milan and Lodi seventy-seater vehicles are to be employed. There is also a proposal under consideration for the employment of trolley-bus services in the centre of Milan.

The attention of the Italian electrical industry is also directed to the expansion of overseas markets. Three Diesel-driven generating plants are to be installed shortly in the capital of Ethiopia to produce electricity for public and private use, and a high-voltage line is to be constructed from Addis Ababa to the industrial zones of the country for the purpose of supplying power to the mines.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Chloride Electrical Storage Co. (India), Ltd.—Private company. Registered August 23rd. Nominal capital £100. Objects: To carry on the business of makers of and dealers in and repairers of electrical and chemical appliances and goods, exploiters of inventions, engineers, manufacturers of motor-cars and flying machines and accessories thereof, makers of and dealers in clocks and fancy articles of all types, electricians, mechanical engineers, suppliers of electricity, &c. The first directors are: W. S. Naylor, 44, Park Road, Pendleton, Salford, 6, E. C. Hopkinson, Kettlethorns, Sway, Lymington, Hants, Sir John P. Hewett, Kt., Court House, Chipping Warden, Banbury, J. R. Williams, 19th Street and Allegheny Avenue, Philadelphia, Pa., D. P. Dunne, 137, Victoria Street, S.W.1, R. C. Norberg, Allegheny Avenue and 19th Street, Philadelphia, Pa., H. B. Gay, Allegheny Avenue and 19th Street, Philadelphia, and H. W. Lee, Reinden Wood, Hawkinge, Kent. Secretary: C. M. Mills. Registered office: Exide Works, Clifton Junction, nr. Manchester.

World Radio Supply Stores (Nottingham), Ltd.—Private company. Registered August 26th. Capital, £6,000. Objects: To acquire the business of wireless and electrical dealer carried on by G. Horsley as World Radio Supply Stores at 24, Southwell Road and elsewhere in Nottingham. The directors are: G. Horsley (chairman), and Elizabeth Horsley, both of 5, Middleton Boulevard, Nottingham, and two others. Registered office: 24, Southwell Road, Nottingham.

Gilberts (Hull), Ltd.—Private company. Registered August 26th. Capital, £6,000. Objects: To acquire the business of a wholesale radio, gramophone and electrical dealer carried on by Ernest Hibbard at 23, South Street, Hull, as Gilberts (Hull). The subscribers are: E. Hibbard, Kildonan, Ings Road, Hull, and S. Gale, 29, Grosvenor Road, Newcastle-on-Tyne. E. Hibbard is permanent governing director. Solicitors: Middlemiss, Pearce & Miller, 11, Parliament Street, Hull.

W. R. Bell, Ltd.—Private company. Registered August 24th, in Edinburgh. Capital, £100. Objects: To manufacture and sell all kinds of radio and television apparatus and electrical goods, &c. The directors are: Wm. R. Bell, 9, Mavisbank Gardens, Belleshill, and J. M. McCullock, 17, Pollock Street, Mossend, Belleshill. Registered office: 380, Brandon Street, Motherwell.

Elliotts Liverpool, Ltd.—Private company. Registered August 24th. Capital, £300. Objects: To carry on the business of manufacturers and repairers of and dealers in light, heat, sound, power, electrical, galvanic, optical, marine, aeronautical and other equipment, instruments and apparatus, &c. The subscribers (each with ten shares) are: Wm. Elliott, 127, Score Lane, Broadgreen, Liverpool, 16, and W. Horton, 223, Queen's Drive, Wavertree, Liverpool. W. Elliott is first director. Solicitors: Hannay, Horton & Cook, Liverpool.

Elfin Electric, Ltd.—Private company. Registered August 27th. Capital, £100. Objects: To carry on the business of electricians, mechanical engineers, &c. The directors are: A. H. Silcocks, 43, Mawneys Road, Romford, E. H. Silcocks, 105, Havering Road, Romford, and F. H. Hardingham, 54, Meshiters Walk, Romford. Registered office: 56, High Street, Romford.

Cyril F. Taylor, Ltd.—Private company. Registered August 28th. Capital, £1,000. Objects: To carry on business as electrical contractors, &c. The first directors are C. F. Taylor (permanent managing director) and Mrs. D. E. M. Taylor, both of 184, Upper Elmers End Road, Beckenham, Kent, and A. G. Hancock. Secretary: Mrs. D. E. M. Taylor.

Scandinavian Lighting, Ltd.—Private company. Registered August 28th. Capital, £1,500. Objects: To carry on business as dealers in all kinds of fittings and equipment for use with electric light, gas, &c. The first directors are: C. A. Levin, Valby, Copenhagen, and K. Gerling, 30, Fitzjohns Avenue, N.W.3. Secretary: V. A. Wexham, River Plate House, Finsbury Circus, E.C.2.

Hubrophone, Ltd.—Private company. Registered August 27th. Capital, £100. Objects: To carry on business as manufacturers of and dealers in boilers, turbines, engines, dynamos, accumulators, batteries, motors, cables, telegraphic telephonic and television apparatus, &c. The permanent directors are: E. J. Hutter, 104, Oakley Street, Chelsea, S.W.3 (managing director), and three others. Registered office: 27, Old Jewry, E.C.2.

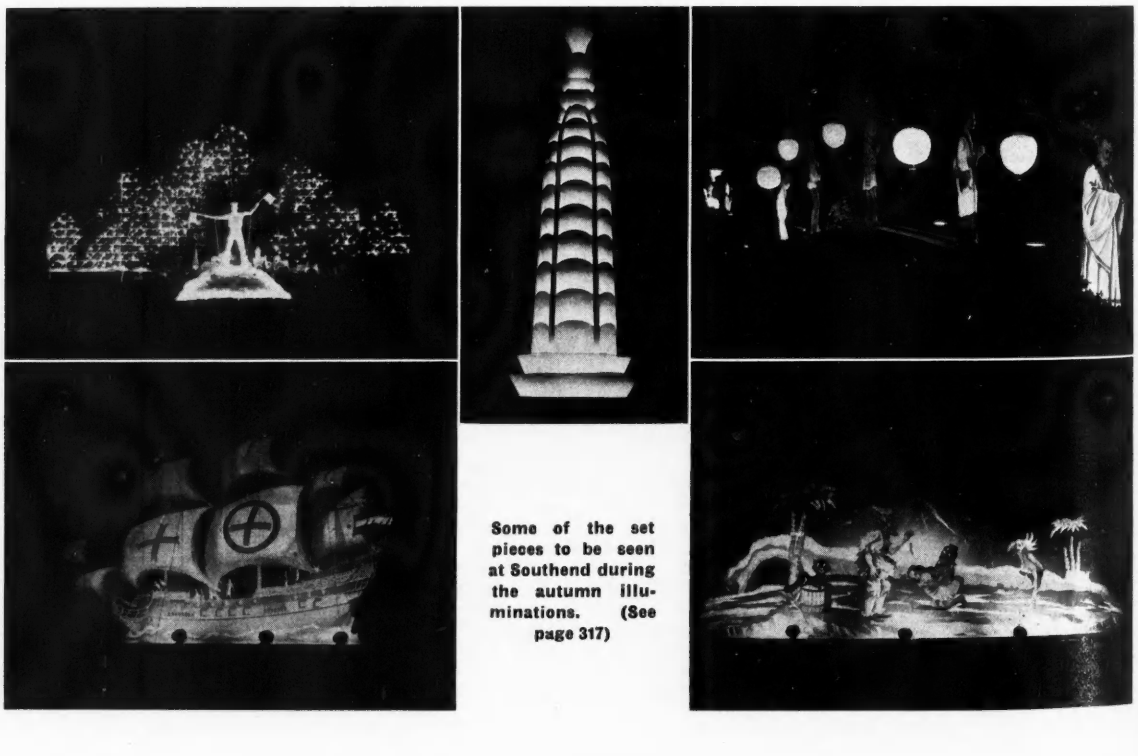
Summit Battery Co., Ltd.—Private company. Registered August 24th. Capital, £100. Objects: To carry on the business of makers of and dealers in electrical and/or chemical appliances and goods of all kinds. The subscribers are: S. Ashton, Eastholme, Trafford Road, Alderley Edge, C. Roby, 45, Abbotsford Road, Blackpool. Secretary: E. Haines, 3, Victoria Road, Northwich, Ches.

Globe Insulated Wires, Ltd.—Private company. Registered August 23rd. Capital, £4,000. Objects: To wind, enamel, lacquer or otherwise cover or insulate metals, metallic wires and fibres and threads of substances of all kinds, &c. The directors are: R. W. Helm, Wentworth, South Drive, St. Annes-on-Sea, F. Briggs, Maygarth, Livesey Branch Road, Blackburn, and J. H. Place, Thorn Bank, Station Road, Marple. Registered office: 13, Cannon Street, Accrington, Lancs.

A.G. Wireless & Electrical Co., Ltd.—Private company. Registered August 23rd. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in new, secondhand and shop-soiled radio and television sets, components and equipment, gramophones, radiograms, electrical equipment and fittings, &c. The directors are: A. J. Gordon and F. E. N. Gordon, both of 41, Courtland Avenue, S.W.16. Registered office, 1,492, London Road, Norbury, S.W.16.

Electric Standard Lamp Co., Ltd.—Private company. Registered August 23rd. Capital, £100. Objects: To carry on the business of standard lamp manufacturers, &c. The directors are: C. D. Openshaw and E. M. Openshaw, both of 34, Lancaster Road, Pendleton, Salford. Registered office: 30, Lower Byron Street, Manchester.

Yunos Distributors, Ltd.—Private company. Registered August 25th. Capital, £100. Objects: To finance the sales of D. Joseph, trading as the Universal Lamp Co., at 23, Rochdale Road, Manchester, 4, merchant factor and distributor of electrical goods and fittings, &c. The directors are: D. Joseph, 13, Talbot Road, Trafford Park, Manchester, and E. W. Monk, 1, Thorn Drive, Heald Green, Cheadle, Ches. Registered office: 23, Rochdale Road, Manchester, 4.



Some of the set pieces to be seen at Southend during the autumn illuminations. **(See page 317)**

Dixon & Wood Sales, Ltd.—Private company. Registered August 21st. Capital, £500. Objects: To carry on the business of engineering, electrical or wireless dealers, sellers or hirers of apparatus, &c. The subscribers are: H. A. W. Wood, 22, Foxley Hill Road, Purley, Surrey, and R. C. Van Houten, 33a, Fore Street, E.C.2. Solicitors: Collier & Co., 6-9, Surrey Street, W.C.2.

F. Grimond & Co., Ltd.—Private company. Registered August 19th. Capital, £1,000. Objects: To carry on the business of manufacturers of, factors and sales agents for, and dealers in refrigerator, ice making and cold storage machinery, plant, apparatus and equipment, including compressors, evaporators, thermostats, expansion, float and other valves, &c. The subscribers are: F. I. Grimond, 56, Becmead Avenue, Kenton, Harrow, and A. G. Everest, 15, Montrose Avenue, Sidcup. F. I. Grimond is permanent governing director subject to holding £500 shares. Solicitors: M. A. Jacobs & Sons, 73/4, Jermyn Street, S.W.1.

Returns of Electrical Companies

Electrolyte, Ltd.—Capital, £100 in £1 shares. Return dated April 30th (filed June 4th), 1937. 100 shares taken up. £100 paid. Mortgages and charges nil.

West Wilts Electric Light & Power Co., Ltd.—Capital, £250,000 in 10,000 preference shares of £5 and 200,000 ordinary shares of £1. Return dated May 4th, 1937. 5,306 preference and 200,000 ordinary shares taken up. £226,530 paid. Mortgages and charges nil.

S. G. Brown (Radio Relay Products), Ltd.—Capital, £250 in £1 shares. Return dated May 17th, 1937. All shares taken up. £250 paid. Mortgages and charges nil.

Llangollen & District Electric Light & Power Co., Ltd.—Capital, £6,000 in 2,500 preference and 3,500 ordinary shares of £1. Return dated June 16th, 1937. 360 preference and 1,753 ordinary shares taken up. £2,113 paid. Mortgages and charges: £1,000.

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in £1 shares (100,000 6 per cent. preference, 200,000 5 per cent. 2nd preference and 4,320,000 ordinary). Return dated May 19th, 1937. 100,000 6 per cent. preference, 179,056 5 per cent. 2nd preference, and 4,299,656 ordinary shares taken up. £1,029,884 paid on 179,056 5 per cent. 2nd preference and 850,828 ordinary, £3,548,828 considered as paid on 100,000 6 per cent. preference and 3,448,828 ordinary. Mortgages and charges nil.

Murphy Signs, Ltd.—E. C. Thorne, F.C.A., of Salisbury House, London Wall, E.C.2, was appointed receiver and manager on August 6th, 1937, under powers contained in debentures dated October 2nd, 1935.

Vaughan Martin, Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £2,000.

McNaught (Lamps), Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £3,000. The additional capital is divided into 1,000 ordinary and 1,000 6 per cent. cumulative redeemable preference shares of £1 each.

Z-Ray Syndicate, Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 shares beyond the registered capital of £2,000.

Wirewell Electrical & Radio Installations, Ltd.—Capital, £5,000 in 2,500 preference and 2,500 ordinary shares of £1. Return dated April 29th (filed June 3rd), 1937. 1,900 preference and 2,500 ordinary shares taken up. £1,800 paid on 1,800 preference shares, £2,500 considered as paid on remainder. Mortgages and charges nil.

Hulton & Hinchliffe, Ltd.—Capital, £500 in £1 shares. Return dated May 8th, 1936 (filed June 5th, 1937). All shares taken up. £500 paid. Mortgages and charges nil.

Adamson, Green & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 16th, 1937. 900 shares taken up. £900 paid. Mortgages and charges: £79 12s. 2d.

J. G. Smithson & Co., Ltd.—Capital, £12,000 in £1 shares. Return dated May 17th, 1937. 11,998 shares taken up. £11,998 paid. Mortgages and charges nil.

Harry Astbury, Ltd.—Capital, £1,000 in £1 shares. Return dated April 6th, 1937. 366 shares taken up. £366 paid. Mortgages and charges nil.

East African Power and Lighting Co., Ltd.—The nominal capital has been increased by the addition of £250,000 in 20s. undenominated shares beyond the registered capital of £1,000,000.

Weldrics (1922), Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated August 16, 1937, to secure all sums due or becoming due up to £1,000. Holder: H. P. Bowler, Herons Lodge, Heronsgate, Herts.

S. D. Mouldings, Ltd.—Second debenture charged on the company's property, present and future, including uncalled capital, dated August 20th, 1937, to secure £200. Holder: H. Unerman, 87, Hackney Road, E.

City Notes

Ismay Industries, Ltd.—Presiding at the annual meeting on August 26th Mr. J. Ismay (chairman and managing director) said that during the year under review they had increased their capital by an issue of ordinary shares at 7s. 6d. per share. Their total interests in subsidiary and associated companies was approximately £1,050,000, against their issued capital of £862,000, and they proposed to adjust the capital position by making an issue of shares later in the year. In the lighting industry they had roughly £450,000 invested, from which they received an income of £57,000. The other interests stood in the books at £600,000. Most of them had progressed satisfactorily. They were proposing to increase the strength of the board during the current year by the addition of one or two further directors. Their lamp business had possibilities for increased profits in the future, and he was convinced that in time the return from their other interests would be at least equal to that which they were at present obtaining from their electric lamps.

The Compania de Electricidad de la Provincia de Buenos Aires (which is controlled by "Chade"), reports gross receipts for 1936, in sterling, of £383,675, as compared with £350,396 in the preceding year. Working expenses, &c., totalled £223,991 (against £235,050), which does not include provision for depreciation of invested capital (£74,377). The net earnings were £159,684 (£115,346), to which is added £27,948 representing interest on bank deposits, other miscellaneous income and profits on exchange. After providing for depreciation of invested capital, directors' fees, &c., there is a balance of £84,287. Reserve receives £8,940, and dividends of 8 per cent. on the pre-preference shares (same) and 6 per cent. on the participating preference shares (2 per cent.) are paid.

J. & F. Stone Lighting & Radio, Ltd., reports a net profit for the year ended June 30th of £86,643, as compared with £50,682 in the preceding year. The issued capital has been increased during the year from £300,000 to £507,500 and there is still a call amounting to £92,500 to be made on 740,000 of the ordinary shares. The preference share redemption fund receives £5,850 and income-tax reserve £7,500. It is proposed to pay a final dividend of 11½ per cent., making 17½ per cent. for the year, on the enlarged ordinary share capital. The previous year's distribution was 12½ per cent. A general reserve is to be established with an allocation of £7,500 and £5,784 is carried forward (against £3,341 brought in).

Vickers, Ltd., has given notice of its intention to redeem the whole of its £2,000,000 (nominal) 5½ per cent. first mortgage debenture stock on December 1st, 1937, at 103 per cent. Stockholders will be paid on October 1st next the full half-year's interest, *viz.*, £2 15s., less tax, per £100 stock, due on that date, and interest, less tax, from October 1st to November 30th, both days inclusive, will be paid with the redemption money. The stock will cease to carry interest after the last-mentioned date. No transfer of the 5½ per cent. first mortgage debenture stock of the company will be registered after October 30th.

The United River Plate Telephone Co., Ltd., proposes to convert the 40,000 £5 preference shares into £5 ordinary shares. Practically all the ordinary shares are held by the controlling company, the International Telephone and Telegraph Corporation. Preference holders who do not wish to convert are offered £5 1s. cash per share. The proposals also include the cancellation of all dividend accrued on the preference shares from June 30th, 1937, the date to which the last payment was made, to September 1st. It is intended to increase the authorised capital from £8,000,000 to £10,000,000.

Strand Electric Holdings, Ltd., reports a net profit for the year to July 11th (including the profits of the operating companies for twelve months to April 30th), of £13,841, an increase over the preceding year of £2,757. After deducting income tax and adding £1,292 brought forward, there is a balance of £11,546 available. It is proposed to pay a final dividend of 6 per cent., making 10 per cent. for the year, and to carry forward £2,864. A dividend of 8 per cent., actual, was paid for the period to July 11th, 1936.

W. Canning & Co. are maintaining their interim ordinary dividend at 5 per cent

Pinchin, Johnson & Co., Ltd., are paying an interim ordinary dividend of 7½ per cent. actual, less tax. This is at the same rate as last year, but on larger capital.

Brown Bros., Ltd., have announced an interim ordinary dividend of 2½ per cent., less tax (same).

Stocks and Shares

TUESDAY EVENING.

WITH the holiday season drawing to its close, there should be, in the normal course of events, a gradual return of business and activity to the principal markets of the Stock Exchange. The conflict in the Far East acts, for the time being, as the principal restraint upon resumption of what may be considered normal business conditions. Some members of the Stock Exchange maintain that the House has not been for many years so slack as it is at the present time. It is not an uncommon thing for a business day to pass without some members booking a single bargain.

A number of minor considerations conspire with the China-Japan war to bring about this stagnation. As to the amount of money available for investment and speculation, there can be little doubt that plentiful supplies of capital are only waiting for what their owners consider to be a suitable opportunity before seeking employment in stocks and shares. Most of the securities with which our own lists are connected maintain a firm front, so far as the quotations are concerned, and there is a reasonable amount of trade doing, more particularly in the shares of the manufacturing and equipment companies.

Radio Yields

Business in radio shares has so far responded little to the stimulus of Radiolympia. Interest has aroused inquiry in plenty, but this was not translated into Stock Exchange activity of the kind likely to move share-prices to any noticeable extent. Radio shares are generally regarded as coming well within the speculative class. Prices show, accordingly, generous yields on the basis of the latest dividends. On E. K. Coles, standing at 16s., the yield on this year's 30 per cent. dividend works out at little short of 9½ per cent. Pye deferred recently converted from 1s. to 5s. shares, stand at 15s.: the return in this case is about 8¼ per cent. on the last-declared

distribution. Ultra Electric, at 7s. 3d., pay about the same on the money. Among the retailing concerns, the 5s. shares of J. & F. Stone, whose results, just published, made a good impression, can be bought at 9s. 6d., ex the 17½ per cent. dividend, to yield over 9 per cent. on the money. Electric and Musical Industries come into a rather different category, owing to the company's interests in various other directions. At 22s., "Emmies" give a return of 4½ per cent. on the basis of the 10 per cent. dividend paid this year.

Globe Telegraph

Globe Telegraph ordinary stock has lately been in considerable demand. This reflects, of course, the improvement which has taken place in the position and prospects of Cable and Wireless, whose stocks constitute the principal items in the Globe Company's portfolio. Having lagged, at first, behind Cable and Wireless stocks in the rise which followed that company's capital reconstruction, the price of Globe ordinary has since gone ahead so steadily as to increase by about £1 per £10 of stock in the course of little over a month. The dividend of 5½ per cent. declared in June was 1 per cent. higher than the previous year's. It was said at the meeting that the increase could be taken as a harbinger of better things to come. The present yield shown on Globe ordinary, at 16¾, is 3¼ per cent., with a reasonably sure prospect of a better return next year. Dividends are paid free of income-tax.

Electrical Equipment Dividends

Several electrical equipment companies distribute their profits only once a year to their shareholders. Talk arises, periodically, that certain of these companies propose to vary the practice by making an interim payment at the half-way stage. Many investors prefer to have two bites at the cherry, where dividends are concerned; the move would be likely, therefore, to prove popular with a good proportion of shareholders in the one-dividend companies. Names commonly coupled with such rumours include the G.E.C., Associated Electrical, Siemens, and the Electric Construction Co. Of these, only Siemens, which paid 7½ per cent., distributed less than 10 per cent. for the last full year. Rumour has, therefore, room for credence—or, to put it into Stock Exchange parlance, scope for talent.

New Issue.

An issue of new shares, on terms not mentioned, was forecast at the annual meeting of Ismay Industries: the object being to adjust the capital position. The company last issued new shares at the end of 1936, the price on that occasion being 7s. 6d. per 5s. share. Those terms led to general expectation that the dividend for the year would be something higher than the 6 per cent. distribution now being made. Dissappointment on this account has been partly responsible for heaviness in the price of the shares, which stand now at 6s., ex-dividend. The price rallied slightly after the meeting.

Miscellaneous Matters

The gilt-edged market remains unperturbed by the present trying circumstances. Prices have moved, if anything, in favour of holders, demand still showing partiality for those stocks with fixed dates for redemption. Idle conditions in the electrical equipment market have been enlivened to some extent by inquiry for English Electric ordinary; the price has risen to 35s. on rather far-sighted dividend prospects. In the same market, Switchgear and Cowans, at 20s. 6d., and Siemens, at 34s. 6d., show improvement. Brush fell to 49. Johnson and Phillips eased off to 46s. 3d. and Ericssons to 52s. 6d. Business in electricity supply issues is at a minimum, but Midland Counties are 1s. up, at 38s. Among traction issues, British Electric Traction deferred shed 25 points, to 1,250, and Tillings a few pence, to 61s. 3d. The Home railway market is all but stagnant, and a similar description applies with equal aptness to the rubber department.

American Conditions

The labour situation in the United States continues to give cause for a certain amount of anxiety to those who hold shares in American railroad and industrial corporations. On this side of the Atlantic, railway workers of different grades have recently obtained increases in pay and improvement in conditions. Railwaymen in the U.S.A. are now demanding concessions which, if granted, will cost the companies a great deal of money. The atmosphere in America is charged with talk of possible strikes, with the result that, in a number of cases, the prices of American securities, especially those in the railroad list, now stand at the lowest points reached during the present year.

A small slump occurred towards the end of last week. Its effect was not confined to America but was felt, in a measure, on this side, contributing to the dullness from which our own markets were suffering. The shares of industrial corporations have not given way to the same extent as those of the railroads. Nevertheless, all are influenced directly or indirectly by general conditions, reflected in a sharp contraction of business. The daily number of shares dealt in by the New York Stock Exchange is nowadays well below the normal. It is estimated that a turnover of about 1,200,000 shares is necessary in New York in order that brokerage houses may pay their running expenses. Several times lately the turnover—which is officially recorded—has dropped well below the seven figure mark.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price Aug. 31.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/6	—	4 7 0
Clyde Valley	1	7	8	2	—	4 0 0
County of London	1	10½	10½	50/–	—	4 4 0
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	39/–	—	4 12 4
Elec. Dis. Yorkshire	1	9	9	41/–	—	4 7 10
Elec. Fin. and Securities	1	12½	12½	2 1/16	—	4 13 0
Elec. Supply Corporation	1	11	12	52/6	—	4 11 5
Lancs Light and Power	1	7½	7½	34/–	—	4 8 3
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red.	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	10	46/–	—	4 7 0
Midland Counties	1	7½	8	38/–	+1/–	4 4 8
Mid. Elec. Power	1	8	9	2 1/16	—	4 7 5
North Eastern Electric Ordinary	1	6	7	32/6	—	4 6 2
Do. 7% Pref.	1	7	7	34/6	—	4 1 2
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	49/3	—	4 1 2
Do. do. 6% Pref.	1	6	6	30/6	—	3 18 8
Scottish Power	1	8	8	37/6	—	4 5 4
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/6	—	6 7 8
Yorkshire Elec.	1	8	8	39/6	—	4 1 1

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	113	—	4 8 6
Do. 1955–75	,,	5	5	116	—	4 6 2
Do. 1951–73	,,	4½	4½	109	—	4 2 7
Do. 1963–93	,,	—	3½	97½	—	3 11 10
London Elec. Trans. Gtd.	,,	—	2½	86	—	2 18 1
London & Home Counties, 1955–75	,,	4½	4½	109	—	4 2 7
London Passenger Transport, A	,,	—	4½	113½	–1	3 19 4
Do. do. B	,,	—	5	117½	—	4 5 1
Do. do. C	,,	4	4	82	—	4 17 9
West Midlands Joint Elec. 1948–68	,,	—	5	111½	—	4 9 8

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$160	9	9	169½	–1½	5 6 7
Anglo-Am. Tel. Pref.	Stock	6	6	122½	—	4 18 0
Do. Def.	,,	1½	1½	29½	—	5 1 8
Cable & Wireless 5½% Pref.	,,	4½	5½	106	—	5 3 9
Do. Ord.	,,	—	—	82½	–½	—
Do. Income	,,	—	—	101½	—	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	16⅞	+⅛	3 5 2
Do. do. Pref.	10	6	6	14½	—	4 5 9
Great Northern Tel.	10	20	20	42	—	4 15 3
Marcon-Marine	1	10	7½	37/6	—	4 0 0
Oriental Telephone Ord.	1	12*	12*	3⅛	—	3 16 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	5/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	21½	—	—
British Electric Traction Def. Ord.	,,	5	5	1250	–25	—
Do. do. Pref. Ord.	,,	8	8	168	—	4 15 5
Brazil Traction	$100	40 cts.	50 cts.	25½	+¼	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	33	—	—
Victoria Falls Ord.	1	20	12	66/3	—	3 12 6
West Riding	1	6½	10	43/9	—	4 11 4

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	15	15	2½	—	6 0 0
Assoc. Elec. Ord.	1	8	10	49/6	—	4 0 8
Do. Pref.	1	8	8	37/6	—	4 5 3
Babcock & Wilcox	1	8	10	48/6	—	4 2 6
British Aluminium Ord.	1	7½	10	55/–	—	3 12 9
British Insulated Ord.	Stock	20	20	4 1/16	—	4 1 0
Brush Ord	Stock	Nil	Nil	49	–1½	—
Callender's	1	15	15	4 1/16	—	3 2 3
Do. 6½% Pref.	1	6½	6½	31/3	+⅛	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	3	—	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	2⅛	—	4 14 1
Enfield Cable Ord.	1	25	25	5 1/16	—	4 8 0
English Electric	1	Nil	Nil	35/–	+6d.	—
Do. do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/–	20	25	2⅛	–⅛	2 7 6
Ever Ready	5/–	35	45	32/0	–9d.	7 0 8
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	86/–	—	4 1 4
Henley's	5/–	30	15	20/6	—	3 13 2
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	7½	10	46/3	–9d.	4 6 6
Lancashire Dynamo	1	10	20	3 1/16	—	5 8 4
Siemens Ord.	1	6	7½	34/6	+9d.	4 7 0
Telegraph Construction	£1	Nil	7½	2⅛	—	2 17 2

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which specifications will be printed and abridged and all subsubsequent proceedings will be taken.

1935

33141. "Electrostatic separation of particles." E. L. Wiegand. December 3rd, 1934. (469877.)

33276. "Method of and means for electric signalling." International Business Machines Corporation. December 7th, 1934. (469761.)

1936

225. "Starting-switches for use in connection with electric motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. January 3rd, 1936. (469935.)

228. "Interlocking and signalling devices for use in connection with electric motor starters." J. A. Crabtree & Co., Ltd, and H. F. McLoughlin. January 3rd, 1936. (469885.)

408. "Automatic temperature control of electrically heated buildings or the like." Ferranti, Ltd., and G. B. Proctor. January 6th, 1936. (469996.)

2894. "Step-by-step electrical transmitters." Sperry Gyroscope Co., Ltd., and W. G. Harding. January 30th, 1936. (470001.)

2942. "Method of producing electrodynamic apparatus for the reproduction of sound." E. Hausdorf. November 4th, 1935. (469806.)

2969. "Telegraph keyboard transmitters." Creed & Co., Ltd., and R. D. Salmon. January 31st, 1936. (469809.)

2970. "Printing-telegraph systems and apparatus." Creed & Co., Ltd., A. E. Thompson and R. D. Salmon. January 31st, 1936. (469810.)

3010. "Thermionic amplifier circuits." British Thomson-Houston Co., Ltd., and J. Moir. January 31st, 1936. (469813.)

3011. "Selecting and isolating switches, particularly for ring-main connections." British Thomson-Houston Co., Ltd., and W. V. Jeffs. January 31st, 1936. (469814.)

3049. "Wireless and like receivers." P. A. Le Marchant. January 31st, 1936. (470002.)

3055. "Electric condensers." A. Carpmael (I. G. Farbenindustrie Akt.-Ges.) January 31st, 1936. (469819.)

3102. "Mosaic-screen structures for television and like purposes." H. E. Holman. February 1st, 1936. (469823.)

3179. "Electrical measuring instruments and relays." Nalder Bros., & Thompson, Ltd., and C. L. Lipman. February 3rd, 1936. (469938.)

3224. "Electric motor control equipments." W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd. February 3rd, 1936. (Cognate application 10541/36.) (470065.)

3230. "Gas-blast electric circuit-breakers." British Thomson-Houston Co., Ltd., H. Trencham and H. E. Cox. February 3rd, 1936. (469892.)

3267. "Gain-control arrangements for valve amplifiers and the like." Marconi's Wireless Telegraph Co., Ltd., and J. D. Brailsford. February 3rd, 1936. (469895.)

3268. "Automatic gain-control circuit arrangements." Marconi's Wireless Telegraph Co., Ltd., and J. D. Brailsford. February 3rd, 1936. (469896.)

3269/70. "Cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd., and N. Levin. February 3rd, 1936. (470004/469897.)

3272. "Electrical measuring apparatus." Marconi's Wireless Telegraph Co., Ltd., and S. W. H. W. Falloon. February 3rd, 1936. (469770.)

3273. "Electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd., and S. W. H. W. Falloon. February 3rd, 1936. (469898.)

3275. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett. February 3rd, 1936. (469899.)

3276. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett. February 3rd, 1936. (469900.)

3299. "Cases for electrical apparatus." R. W. Bill and R. A. Bill. February 4th, 1936. (469902.)

3374. "Method and circuit arrangement for controlling and protecting the operation of controlled gas or vapour electric-discharge gaps." Siemens-Schuckertwerke Akt.-Ges. February 8th, 1935. (470067.)

3507. "Braking systems." British Thomson-Houston Co., Ltd., and T. H. Petch, Jun. February 5th, 1936. (470070.)

3558. "Frequency-control transmission line structures." Marconi's Wireless Telegraph Co., Ltd. February 5th, 1935. (469961.)

3598. "Electric signalling or impulse-transmitting mechanism." R. F. Brown. February 6th, 1936. (470008.)

3623. "Method of scanning pictures or the like by means of Braun tubes having a screen showing persistence of afterglow." E. Michaelis (E. Kinne.) February 6th, 1936. (469907.)

3624. "Process of generating saw-tooth electric vibrations or triangular wave-forms." E. Michaelis (E. Kinne.) February 6th, 1936. (470010.)

3744. "Systems relating to electro-magnetic transmission and their application to navigation." D. N. Sharma. February 7th, 1936. (469775.)

3798/9. "Combinations of electric-discharge devices and materials excited to luminescence by the electric discharge." General Electric Co., Ltd., and J. T. Randall. February 7th, 1936. (469776/913.)

3912. "Multi-blade electric switches, particularly for wireless receivers." K. H. Kerr. February 8th, 1936. (470022.)

3913. "Electric switches, particularly such as are adapted for use in wireless receiving and like apparatus." K. H. Kerr. February 8th, 1936. (470023.)

3928. "Thermionic valve circuit arrangements." Marconi's Wireless Telegraph Co., Ltd., and G. M. Wright. February 8th, 1936. (470025.)

3929. "Electron-discharge device circuit arrangements." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust and E. F. Goodenough. February 8th, 1936. (470085.)

3932. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett. February 8th, 1936. (470026.)

4026. "Fuse boxes or holders." F. A. Holland. February 10th, 1936. (469779.)

5283. "Means for sealing electric conductors through the wall of a hermetically sealed envelope." The General Electric Company, Ltd., and H. D. Stannard. February 21st, 1936. (469832.)

5541. "Variable electric condensers." W. O. Heyne, P. J. Packman, and the Plessey Company, Ltd. February 24th, 1936. (469915.)

7625. "Electric motor control systems." General Electric Co., Ltd., and E. H. Croft. March 13th, 1936. (469839.)

10084. "Electrically driven hair-shearing machine." J. A. Hanley. April 6th, 1936. (469972.)

10359. "Thermal electric meters." P. M. Lincoln. May 8th, 1936. (469849.)

13821. "Quartz to metal joints." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen.) May 15th, 1936. (469978.)

14283. "Method of constructing holders for thermionic valves, terminal strips and like connecting devices for electrical apparatus." G. Campbell and Benjamin Electric, Ltd. May 20th, 1936. (469783.)

15775. "Electric cables." Okonite Co. June 13th, 1935. (469786.)

16606. "Combined battery and magneto ignition system." Wico Electric Co. June 15th, 1935. (470036.)

20995. "Extensible electric cords." H. A. Ungemuth. August 6th, 1935. (470040.)

22036. "Devices for oscillographically recording the action voltages of the human heart." H. E. Hollmann. August 14th, 1935. (469857.)

22709. "Radio-transmission systems." Wired Radio, Inc. December 24th, 1935. (469860.)

23332. "Multi-pole automatic electric circuit breakers." Square D Co. February 18th, 1936. (470047.)

27951. "Signalling or remote-control systems." Compagnie des Téléphones Thomson-Houston. October 19th, 1935. (Cognate application 27952/36.) (469869.)

30562. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 11th, 1935. (469791.)

31028. "Electric hot-plates." Revo Electric Co., Ltd., and F. H. Reeves. November 13th, 1936. (469792.)

32194. "Portable electric-motor driven percussive tools." Siemens-Schuckertwerke Akt.-Ges. November 25th, 1935. (469926.)

34725. "Arrangements for identifying, in radio receiving sets having a geographical dial, the station to which the set is tuned." Fabrica Italiana Magneti Marelli. December 20th, 1935. (469795.)

35752. "Goniometer navigation-aiding and like radio-receiving installations. Soc. Francaise Radio-Electrique. December 30th, 1935. (470060.)

1937

3136. "Starting switches for use in connection with electric motors." J. A. Crabtree and Co., Ltd., and H. F. McLoughlin. January 3rd, 1936. (Divided out of 225/36.) (469930.)

9092. "Bow collectors." Siemens-Planiawerke Akt.-Ges. für Kohlefabrikate. March 28th, 1936. (469990.)

20650. "Electric motor control equipments." W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd. February 3rd, 1936. (Divided out of 3224/36.) (469958.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 25th:

Vibralite. No. 576318. Class 8. Signs illuminated by means or light reflective surfaces or by internal artificial light.—Vibralite, Ltd., 27, Old Jewry, E.C.2.

Tiny-Tim. No. 577608. Class 8. Battery charging apparatus.—Continental Motors Corporation, Detroit, Mich., U.S.A. (British representatives, Frank B. Dehn & Co., Kingsway House, 103, Kingsway, W.C.2.)

Monarch Electric. No. 572152. Class 13. Kettles, saucepans, coffee percolators and shaving pots, all being electrically-heated, and electric immersion heaters, all being of ordinary metal.—Evenson Brothers (1928), Ltd., Stanley Works, Wollescote, Lye, Worcestershire.

Design only. No. 577162. Class 50. Thermostatic and thermosetting plastic moulding materials, all having a basis of synthetic resin, cellulose derivatives, casein, natural resin or bitumen, and articles made therefrom.—British Industrial Plastics, Ltd., Ideal House, 1, Argyll St., W.1.

Romac. No. 577333. Class 50. Resin, oil or bitumen for insulating purposes, etc.—Romac Motor Accessories, Romac Works, The Hyde, Hendon, N.W.9.

Cement Factory's Hydro-electric Station

The Swedish Asea Co. has recently established, through its Colombian agents, Compania Sudamericana SKF, a small hydro-electric plant at the works of the Febrica de Cementos Portland Diamond at Apulo, Colombia. Three horizontal turbines are directly coupled to 700-kVA, three-phase, 50-cycle, 6,600-V, 600-r.p.m. generators of the end-shield bearing type with directly coupled, overhung 110-V exciters. They are connected to busbars through automatic oil circuit-breakers and current and voltage transformers. The outgoing line is connected to the bars through an oil circuit-breaker and choke coils and is provided with horn-gap lightning arrestor equipment with series resistances.

The contract also included a sub-station equipped with two 700-kVA, 6,600/400-V transformers and automatic oil circuit-breakers on both high- and low-voltage sides. The power is distributed at 400 V through twenty-seven feeders, each including circuit-breaker, fuse protection, and ammeter.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberayron.—Houses (28), adjoining Wellington Street and Greenland Terrace; C. Scriven, Merthyr Tydfil.

Aberdeen.—Cinema for the Associated British Picture Corporation, London (3,000 places); secretary.

Airdrie.—Houses (73), Forrest Street and Towers Road; burgh surveyor, Municipal Buildings.

Batley.—Houses (70), Bunkers Lane estate; borough engineer, Brunswick Street.

Beddington.—Fire station (£11,000); U.D.C. surveyor.

Bedworth.—Houses (100), on the Wootton Street-Marston Lane estate, for the U.D.C.; Asphalt & Public Works Co., contractors, Norwich Union Chambers, Edmund Street, Birmingham, 3.

Birmingham.—Transport depôt, Yardley Wood Road (£110,000); city engineer.

Blackburn.—School (800 places), Shakespeare Mill estate, for the Blackburn Church Schools Association; E. Cooper, architect, Richmond Terrace. School (480 places), Byrom Street; W. Stirrup & Son, Richmond Terrace.

Blackpool.—Cinema, junction of Waterloo Road and Whitegate Drive, Marton (1,200 seats); A. Hall, South Shore Theatres, Ltd. Houses (20), Waller Avenue, &c.; J. Ridyard, builder, Beaufort Avenue, Norbreck, North Shore.

Bolton.—Houses, Willows Lane (35), Top-o'-th'-Brow estate (274), and estate off Ormrod Street (60); V. H. Hughes, housing director, Westminster Bank Chambers, Old Hall Street.

Briton Ferry (GLAMORGAN).—Cinema, Cardiff and Neath Roads; Griffith, Davies & Co., builders, Paxton Yard, Swansea.

Caerwent (MON.).—Houses (34), for Welsh Land Settlement Society (£14,068); W. H. Bate, builder, Caerleon, Newport, Mon.

Cheltenham.—Houses (24), New Barn Lane, Prestbury, for R.D.C.; A. Bowd, builder, Waterloo Street.

Chertsey.—Houses (32), Chertsey and Addlestone; W. V. Davies, U.D.C. surveyor, Council Offices.

Conisborough.—Extensions to the Conisborough Isolation Hospital (£54,000); Walker & Thompson, architects, Carbon Chambers, Hall Gate, Doncaster.

Consett (Co. DURHAM).—Sewerage works (£119,000); Balfour & Son, 3, St. Nicholas' Buildings, Newcastle.

Coulsdon.—Houses (22), Winifred Road; W. H. Gorham.

Darlaston.—Cinema, Walsall Road, for Clark, Brook & Co., West Bromwich (electrical work); R. Satchwell, architect, 6, New Street, Birmingham.

Deben (WOODBRIDGE).—Houses (26), Tunstall, Witnesham and Wickham Market; R.D.C. surveyor, Woodbridge, Suffolk.

Dewsbury.—School, Temple Road; borough architect and building surveyor, Town Hall.

Dudley.—Stores, High Street, for Edward Grey, Bull Street, Birmingham (£20,000), (electrical work); A. J. Crump & Sons, builders, Aston Road.

Dunfermline.—Extensions to St. Leonard's Hostel for the National Committee for Training of Teachers (£40,000); J. W. Ormiston, secretary to the Carnegie Dunfermline Trust.

Durham.—Additions to Seaham Harbour Girls' school (£12,000), remodelling of the Tanfield Lea school (£5,000), and schools at Shiney Row and Sherburn; county architect, 34, Old Elvet.

Edinburgh.—School, Craigmillar Castle Road; city architect. Students' Union (£20,000); architect, University.

Enniscorthy.—Houses (22), Lymington Road (£10,113), for U.D.C.; N. C. Williamson, builder, Abbey Quarry, Emsworthy.

Essex.—Library, Highbridge Street, Waltham Abbey; County architect, Chelmsford.

Freebridge-Lynn.—Houses (22), Fair Green Lane and Water Lane, Middleton (£7,962), for R.D.C.; R. Claxton & Sons, contractors, Wells, Norfolk.

Glamorgan.—Welfare Centre at Talbot Road, Llantrisant (electrical work); T. Saunders, surveyor, Council Offices, Pontyclun. School at Whitchurch (electrical work); county surveyor, County Hall, Cardiff.

Glasgow.—Houses (700); housing director.

Glossop.—Houses (20), Simmondley Lane; G. Faulds, borough surveyor, Municipal Buildings.

Halesowen.—Offices, shops and houses on Kent Road, for B. W. Darby, Greenhill, Mucklows Hill; J. C. T. Cole, architect, Central Buildings, Long Lane, Blackheath, Birmingham.

Hanley.—New works for Langley & Co., Clough Street; Mr. Campbell, architect.

Hull.—Aerodrome for Blackburn Aeroplane and Motor Co., Seaplane Base, Brough; Williams & Jopling, architects, Ferres Chambers, Whitefriars Gate.

Inverness.—Additional buildings at Municipal aerodrome (£15,000); burgh surveyor.

Irish Free State.—(DUBLIN).—Flats (112), Marrowbone Lane estate, for the Corporation; H. G. Simms, housing architect. 3, Parliament Street. (LIMERICK).—Houses (52), Kilmalloch (£19,552), for County Board of Health; M. Clancy, builder, Cathedral Place.

Kent.—Central dispensary, Wren's Cross, Maidstone (£5,700); extensions to children's homes, Medway (£4,950); five-year hospital scheme (£1,247,000); library, Whitstable; conversion of Broomhill, Tunbridge Wells, to institute, &c. (£8,000); extensions to Sanatorium, Lenham (£22,000); casual wards, Malling (£3,350); school, Maison Dieu Road, Dover; school, Tenterden; library, Westerham; county architect.

Kettering.—Extensions to Avondale school (£6,714); Education Committee. Junior and infant school, Windmill Avenue (760 places), for U.D.C.; Blackwell & Storry, Gold Street Chambers.

Lancashire.—School, Formby, Southport (£15,520), for E.C.; Duxfield Bros. (Southport), contractors, Virginia Street, Southport.

Lincoln.—Houses (698); city engineer.

Liverpool.—St. Edwards school, Sanfield Park, West Derby, for the Governors (£50,000); C. J. Doyle, contractors, 15, Victoria Street. School, Yew Tree Lane, for the Trustees of the Broughton Hall Girls' school; J. Lucas & Son (Builders), Eccleston Lane, Prescot. Schools for about 2,300 children on the Speke housing estate, for the Education Committee; A. D. Jenkins, land steward and surveyor, Municipal Offices, Dale Street.

Llantrisant and Llantwit Fardre (GLAM.).—Maternity and child welfare centres at Talbot Road, Llantrisant, Gwaunmiskin Road, Beddau, and Gelliarael Road, Gilfach Goch; Thomas Saunders, R.D.C. surveyor, School Street, Pontyclun, Glam.

Llwchwr (GLAMORGAN).—Houses (28), for U.D.C.; clerk to the Council, West Street, Gorseinon.

London.—Houses (54), Delamere Road, E.; Bloomfield Building Co., Warwick Dene Estate, Ealing. (FULHAM).—Rehousing in the Avenue area (£195,000); borough engineer. (SOUTHWARK).—Two blocks dwellings (£50,000), Pocock Street area; borough surveyor. (STEPNEY GREEN).—Nurses' hostel and staff quarters, London Jewish Hospital, E.1; Kirk & Kirk, contractors, 287, Upper Richmond Road, Putney, S.W.15.

Marlow.—Cinema, Marlow Place, for County Cinemas, Ltd.; Y. J. Lovell & Sons, contractors, Gerrards Cross.

Meriden.—Houses (22), Fillongley (£8,805), for R.D.C.; A. E. Gilks, builder, Coventry.

Middlesex.—Modernisation of blocks at Central Middlesex County Hospital, Acton Lane, for C.C. (£17,948); E. Plaistowe & Sons, contractors, Southall.

Middleton (LANCASHIRE).—Houses (68). Newport Street, &c.; R. Naylor (Builders) (1936), Ltd., 105, Manchester Old Road.

Milford Haven.—Municipal offices, Hamilton Terrace; U.D.C. surveyor, Council offices.

Nantwich.—Houses (54); R.D.C. surveyor, Council Offices, 21, Pillory Street.

Neath.—Houses (50), Crynalit estate (electrical work); R. Alex Clarke, engineer, Gwyn Hall.

Newcastle-on-Tyne.—Cinema, St. Anthony's, for Benshaw Picture House Co.; Gordon Durham & Co., contractors, Moor Lane, Boldon.

Newcastle-under-Lyme.—Shops and offices, junction of High Street and Ironmarket; borough surveyor.

Newport (FIFE).—Houses (40), Flass Road, Woodhaven, for T.C.; Nelson Stewart, architect, Alma Terrace.

Northern Ireland (DUNGANNON).—Extensions to Fever Hospital (£12,339); Benson Bros., contractors, Cookstown.

Northfield.—Cinema at Longbridge for Danilo Circuit (electrical work); E. S. Roberts, architect, Great Charles Street, Birmingham.

Nottingham.—Police headquarters and fire station (£153,700), Shakespeare Street and South Sherwood street; city engineer. Houses (44), Derry Hill Road and Lilleker Avenue, Arnold, for J. Lilleker, builder, Corner House, Acton Road, Arnold; J. Higginbottom, architect, 76, Friar Lane.

Pendlebury.—Enlargement of Cromwell Road school (£35,612); Education Committee.

Peterborough.—Houses (30), Maxey Glinton, Newborough, Eye, Helpston and Ailesworth, for R.D.C.

Ploughley (BICESTER).—Houses (30), Aysgarth estate, Yarnton; Hayward & Co., Woodstock Road, Yarnton.

Preston.—Nurses' home for the Committee of Visitors' County Mental Hospital, Whittingham; W. P. Horsburgh, architect, D16, Exchange Buildings, Liverpool, 2.

Rothesay.—Cinema, Argyle Street (£25,000), for Palace Cinema Co.; R. Pert & Son, builders, Montrose.

Runcorn.—Houses (72), Ivy Street Housing estate, for the U.D.C.; W. H. Davey, Taylor's Row.

Saddleworth.—Houses (32), and bungalows, at Denshaw, for the U.D.C.; R. Fleeson & Son, contractors, Clarence Street, Manchester.

Sale.—Houses (200), on Beech Farm estate, for the T.C.; Leyland Construction Co., Contractors, Leyland, near Preston.

Scunthorpe.—Block for Scunthorpe and District War Memorial Hospital (£50,000); Elcock & Sutcliffe, Adam House, 60, Strand, London, W.C.2.

South Molton.—Houses (35), on the Mill Street estate (electrical work); borough surveyor, Municipal Offices.

Staines.—Factory for T. Grimble & Son, George Street.

Staveley.—Houses (38) and bungalows (8) at Norbriggs, for U.D.C.; J. B. McGaw, surveyor.

Stockport.—Houses (2,000), at Bramhall; S. Beckett, Whitehall Chambers, 3, Spring Gardens, Manchester.

Stokesley.—Houses (22), for the R.D.C.; T. Crokell & Sons, builders, Redcar.

Stourbridge.—Cinema at Amblecote (1,200 places), (£30,000); McKeand, Smith & Co., builders, Showell Road, Wolverhampton.

Tenterden.—Houses (20), Ox Lane, St. Michaels; borough surveyor.

Towyn and Aberdovey (MERIONETH).—Houses (38); U.D.C. surveyor, Council Offices, Towyn.

Ulverston.—Houses (62), for U.D.C.; F. W. Poole, clerk to the Council.

Wellingborough.—Central health clinic, Rock Street Council school, for Northants C.C.; county architect, County Hall, Northampton.

Westerham.—Development of Grange estate: Estate Co.

Wolverhampton.—Cinema, Craisley Hill (£30,000); Roland Satchwell, architect, 6, New Street, Birmingham.

Wolverton.—Houses (104) and bungalows, continuation of Cambridge Street and Windsor Street; U.D.C. surveyor.

Wortley (SHEFFIELD).—Cinema, Sheffield Lane; Hadfield & Cawkwell, architects, 19, St. James's Street, Sheffield, 1.